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Vol. 3—No. 6

THE PAPER INDUSTRY

A. SCOTT DOWD
Editor

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

CONTENTS

FOR SEPTEMBER, 1921

Editorials ..... 797, 801 and 805
$300.00 for an Article 809
Out Fishin' (Poem) ..... *Edgar A. Guest* 816
Ravages of the Book Worm ..... *Wm. R. Reinicke* 819
Waste in Boxboard Mills ..... *Richard Clayton* 823
Pulverized Coal, Its Possibilities in Paper Manufacturing ..... *Ralph Galt* 824
Moisture Testing; What About the Man? ..... *T. Linsey Crossley* 828
Sulphite Digesters for Direct Cooking ..... *Harry E. Weston* 829
Cost, Co-operation and Diplomacy ..... *Charles H. Martin* 833
Graphic Boiler Plant Records ..... *E. R. Low* 835
Chemical Control for De-Inking Paper ..... *C. M. Joyce* 838
Accident Records ..... *National Safety Council* 839
Power Plant Management ..... *Robert June, M. E.* 843
Sulphite Pulp ..... *P. A. Paulsen* 847
15-Ton Cranes in Handling Wood Pulp ..... *Arthur F. Allen* 850
Selling Scientifically and Manufacturing Methodically ..... *T. J. Burke, C. A.* 853
Handy Chart for Determining the Flow Through Pipes ..... *W. F. Schaphorst, M.E.* 859
Temperature Regulator Chart 861
Responsibility for Industrial Accident Prevention ..... *George P. Hambrecht* 863
Tenth Annual Conference of Hammermill Agents 871
Commercial Outlook 893
Domestic Markets 895
Current Quotations 901
Import and Export Markets 903
Buyers' Guide 909-913
Index to Advertisers 915

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We Cannot Succeed by Wasting

"ANYONE would think you was paying for it to hear you talk" was the expression that one employe in a certain paper mill made to another when one of these men called the other's attention to a certain waste which he was causing.

During recent months, on account of shrinking profits, an edict had gone forward that the cost of running this plant would have to be drastically cut. Heads of departments found that the required reduction could not be made without laying off a considerable number of employes. One of the first to be laid off was the young man whose remark is quoted above. His superior knew that this man gave little thought to preventing waste, but used up supplies and materials carelessly and recklessly. By laying him and his type off, the saving was not only in his wages, but in a lot of waste.

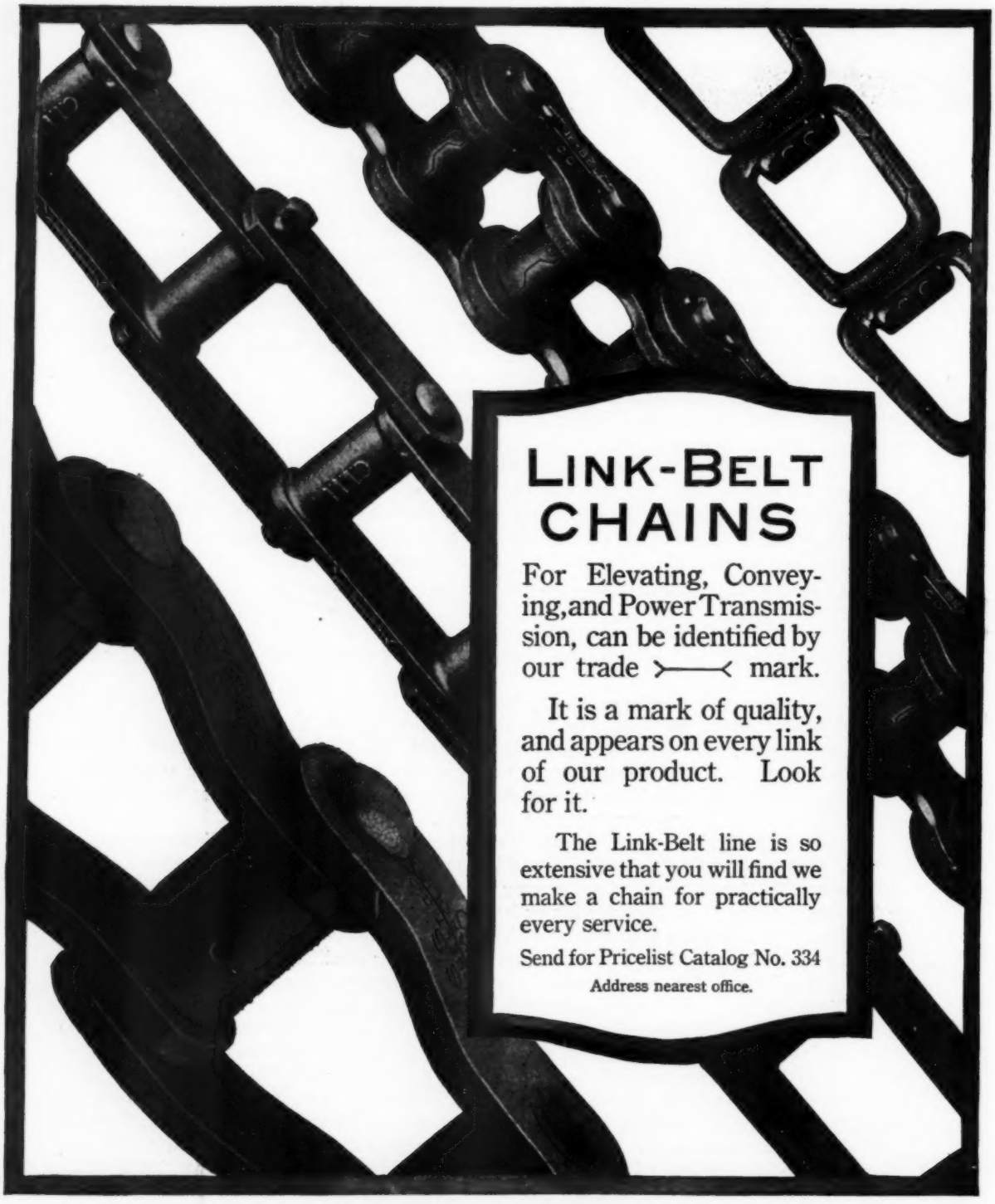
During the war extravagance ran rampant in many paper mills, as well as in all other kinds of manufacturing establishments. So many dollars were to be had that the pennies were not counted. Economy was regarded as unnecessary. Those in charge of materials and supplies handed out orders on any kind of requisition, the principal thought being to get out a production without consideration of the cost. When the need for this break-neck speed ceased, the spirit of economy did not return as it should have done. When the collapse in general business came, this institution was rather badly hit and orders immediately went out to retrench. Outside efficiency experts were called in and they not only weeded out a large percentage of the working force that was not efficient, but were able to double-up many positions, and they installed a thorough watch on everything that went out in the shape of materials and supplies, and a careful record was kept of everything issued. An investigation was made as to the amount of supplies each department must necessarily have.

In times of stress like these the employe who has been wasteful is the first one to be without work. All business must be run at a profit or cease to be run. The more loafing and more wastefulness carried on in an establishment, the less will be the profit. When these profits are large, most employers are disposed to treat their employes generously, but when profits fail, it is then necessary to cut out everything that does not produce efficiently, whether this be employes or material.

Profits must first be earned before there is any money to buy supplies or pay employes. The best method to assure a profit in any business is for everyone to work intelligently and hard and to exercise economy in all directions. The employe who does this is helping to make it possible for his or her employer to pay wages and improve working conditions. The employe who wastes either time or materials is doing his or her worst to bring about lower wages and less favorable working conditions.

It is much worse for an employe to be wasteful at business than at home, for at business this employe is misusing what is not his or her own, and this is pretty nearly being dishonest. Anyone of the right caliber would rather waste his or her own time or material than that which belongs to someone else, but it is often the person that is most careful with his or her own possessions that is most wasteful with that of the employer's.

"Anyone would think you was paying for it"—you are, for unless your employer is making a reasonable profit on his investment and for his time spent, he cannot afford to pay you a reasonable wage. America cannot expect to maintain its leadership unless we turn from extravagance and wastefulness to economy and whole-hearted working efforts. It is really economy that brings good times, and we cannot expect the return of normal conditions in America until we have overcome many of the bad habits which we have had ever since the beginning of the war. Every employe, no matter how high or low his position, should not only see that his time and efforts are devoted to building up the organization with which he is associated, but each one should personally see that any waste in time or materials which has heretofore been allowed, should now cease. This is the work of every man and woman employed in every paper and pulp mill.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Business Sense

By IKE KENNEDY

The Men Who Know

THERE are two very prominent business Diagnosticians in this country, who by their thorough understanding and analysis of all matters pertaining to business, have gained our confidence by their leveled headed mastery of doubtful situations. These men are no other than Hoover and Babson. They are not Wizards, they are not Prophets, they are just plain "he" men who have been studying while others have been guessing. They have gained our confidence because they have not sought "the limelight" and have studiously avoided it whenever it has been turned upon them. It is hard to get an expression from these men, and you can't hope to get one, that is not supported by long and careful thinking and knowledge of facts supporting it. When Herbert Hoover permitted himself to utter the statement "The turning point for the better is here" Herbert Hoover meant that he saw positive evidence that the sleeping Giant, Business, was bestiring himself. He had behind that statement, positive proof that the tide had turned, and you may rely upon it that he never gave voice to that sentiment until he was convinced from the facts within his possession, that he was right.

Babson is another modest reader and thinker, content to dwell far removed from the maddening throng in Wellesly Hills, Mass., who studies human relations based on the assumption that the law of action and reaction applies to us jointly and severally; assuming that "abnormal activity must follow abnormal depression" or vice versa, and "that we as nations must ourselves get what we give and must prosper as we serve." When Babson tells you that your dollar is no longer a fifty-cent dollar, that the average cost of living is 18% less than this time last year, that food stuffs have dropped exactly one third, and clothing even more, Babson knows. He also knows, if he would say so, that extortionate rents yet prevailing and without reason, are responsible for retarding our immediate return to a sound basis of living, and are directly responsible for a debased dollar which has not yet reached its 100% buying power because the Landlord is able to dodge behind the Law of Supply and Demand. It's always easier to jump the track than it is to get out the wrecking crew and get back, and it's going to require a little time and patience to note any perceptible progress. We may have to run off our schedule time for a little while, and it is always wise to run cautiously until schedules are established, but our reliable train dispatchers Hoover and Babson say the track is clear. Our New Superintendent of Maintenance and Way, Mr. Harding, says that things are well in hand and going good, and there is a general feeling of confidence that we have once more become the masters of a very doubtful situation, we are returning triumphant—it was a good fight, and let's congraulate ourselves that we escaped with our hides. Now then come on, let's go to work, let's put some of that wonderful war time zeal and energy behind our efforts. Get the stroke, pull together.

Think Hard

THERE are not enough thinkers, not enough people who have mastered the art of concentration. We imagine we think but we let too many good ideas get away from us. Right now we need thinkers for the men who follow thinkers. There are whole armies of unemployed waiting for a Moses to lead them out of this Wilderness, waiting for leaders to master a situation that has rendered them all but prostrate. There is no panic in the land, men have endured and survived too much trouble in this generation to lose their heads even though their hearts be troubled. They have learned to sit tight, learned to despise the fellow who rocks the boat, learned to scoff at the idea that the future is hopeless. Don't be satisfied to let the man who employs you do all the thinking, give a thought to his troubles and help him solve some of them. The more you think about what he is going through, the more fully will you realize and appreciate the magnitude of his burden. Don't put him down as a brute for discharging you, he's simply bailing the water out of a leaky boat. He hasn't thrown you over board as a Jonah, he has simply cast you off because you wouldn't bail when the bailing was good. You are excess baggage, you are neither food nor drink in a storm like this, he knows it—you know it! You haven't been thinking, you have let others think for you, and you have allowed them to put some strange notions in your head. A good thought is not only tax free but bonus compelling. This job of setting the house in order is too big for any single group of thinkers, it is going to require the concentrated effort of every mother's son of us, you included. Let's all make up our minds that on October 1, 1921, business starts off with a bang. Let's do something to put this thought into effect. We nearly had it ready for launching in May, we moved it a peg and it slipped back, because we were not all pulling together. Spread this idea far and wide and watch the effect. Business is entitled to a regular ovation on her return; make her understand that she is most welcome.

1896 1921

Service and Satisfaction

built into every wire that has left the shop of the Appleton Wire Works has been our aim during the twenty-five years we have been in business.

The fact that we have had to double and treble our plant and output in recent years, proves that we have attained these aims, at least to some degree. Every thought for the future, however, is based on the same proposition. These are some of the reasons why

"Appleton Wires Are Good Wires"

APPLETON WIRE WORKS
APPLETON, WIS.

1896 1921

Hidden Power

BY T. H. CARROW

Member of the Executive Committee, National Safety Council

WAY down deep in our beings there are springs of power that never have been tapped.

What we have done, what we are doing and what we shall do is but little indeed, as compared with what we might have done, what we are doing and what we can do.

Once upon a time somebody discovered coal would burn and give out heat and ever since this great power, which for ages had lain useless under the surface of the earth, has been appropriated to man's use.

Throughout all time the wild waters of the Rocky Mountains ran, aimlessly and without service to man, down the valleys and into the sea. One day a dam was built and now millions of acres of erstwhile arid lands, which bring forth fruits and flowers in abundance, have been reclaimed and dedicated to the health and comfort of human society.

When the light of day first dawned upon this terrestrial globe the Creator impregnated it with electricity, but not until Franklin discovered it and Edison, Steinmetz and all the rest of the great scientists captivated it was it possible to appropriate this universal force to man's use and comfort.

Everywhere we look there is evidence of power that some single human being has discovered, evidence of some great principle being applied in human society that was shrouded in mystery and ignorance until some individual developed and applied it.

Humanity does but little that is worth while en masse. It is the combined result of individual effort directed toward the accomplishment of great purposes that counts and the questions we must ask ourselves are these:

What are we doing to discover truth and apply it in our lives?

What effort are we making to create a keener vision for the things that are beautiful?

What plans are we following to develop a better appreciation of the good and the true?

What are we contributing to make things right in this dear old world that can be so readily adjusted by just a little systematic effort on our part?

To what extent are you drawing upon the hidden resources of your being as a contribution toward making your life and the lives of all men and women more efficient and happy? Your answer to this question is your measure as a responsible member of organized society. One power that you can use more with advantage to yourself and to the world is the influence you can wield for Safety.

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Received Between October 1, 1920, and September 30, 1921

THE PAPER INDUSTRY was started with the one idea of being helpful to the whole Pulp and Paper Manufacturing Industry. We believe we have succeeded. At least many people tell us so, but we want to do more in being helpful, so that every man in the industry may know more of his chosen work.

Many men in this industry have valuable ideas that would be worth hundreds, possibly thousands of dollars, for other men to know, and at the same time will not harm the one man that knows it. The old idea of hiding our light under a bushel for fear someone else will learn of something that we may know has passed, and the war was to a large degree responsible for this. It is stated that America advanced more in most of the arts and sciences, as well as manufacturing processes, in the few years of the war period, than it had in fifty years before.

We lose nothing by giving out knowledge. If each of two men have a dollar and each gives his to the other, both will have the same and gain nothing, but if each of two men have an idea, and each gives away that which he has, he does not lose, but each has two, and so if we multiply this by one hundred or a thousand, each man that formerly had only one idea, now has a hundred or thousand, and no one has lost.

So, in order that the greatest number may have the greatest amount of knowledge, and in order to get men to take the time for the proper study and preparation of the right kind of an article, we will give to those who will endeavor to furnish us with real helpful articles, during the next twelve months, the following amounts:

For the best article furnished in this competition, we will give the sum of $300.00.
For the second best article we will pay $100.00.
For the third best article we will pay $50.00.
For the fourth best article we will pay $25.00.
For the fifth best article we will pay $15.00.
For the next thirty-one best articles, we will pay $10.00.
For the next forty best articles we will pay $5.00.

Any one man may write as many articles as he desires, providing they are on different subjects. Each article, however, should fill at least three pages of THE PAPER INDUSTRY.

Several well known men of the industry will be chosen as judges in this competition, their names to be announced at a later date, and the publisher of THE PAPER INDUSTRY will only decide first whether the article is worthy of publishing at all, and if so, then it will take its chance for the $300.00 prize.

In order to make it possible to publish these papers during the next twelve months, papers must begin to come in immediately and the minimum price of $5.00 will be paid for each as they are published, the balance representing the prize money will be awarded after the twelve months period has expired, and the decisions have been made.

Some men feel that they know many good things, but cannot write them down in proper fashion. It will not be necessary that these articles be written to show any great amount of learning, as many men who have had little schooling may be able to furnish the most helpful ideas, and it is something that is helpful that we want; we have an editor for the very purpose of carefully scrutinizing everything before it goes to the printer, so that it may be grammatically and typographically correct.

You can choose your own subject, as there are so many things to be written about in this great industry that we will not even attempt to outline the full list of subjects, but it may be of some plan to get a larger product out of a machine; it may be on the subject of saving in the power plant; saving bleach, dye, or one of many other things; it may be a plan to make the wire or felt last longer; some method of making a better sheet without increasing the cost, or making as good a sheet by reducing the cost; a new idea in the process of pulp making; in fact it can be on any subject that will be helpful to pulp and paper manufacturers, and their employes.

Anyone can try his hand, be he president, manager, superintendent, chemist, engineer, machinery man, foreman, or workman. If some one should feel they cannot write a long article, then write a short one. We will pay for it, if we can use it.

Start NOW and get your article or articles in at the earliest possible time.

Address all articles in this competition to

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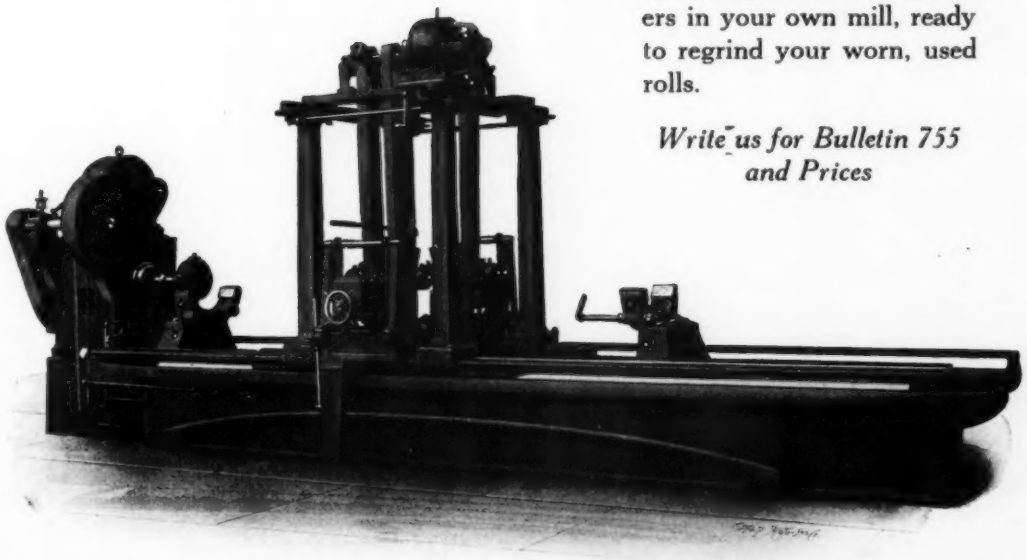

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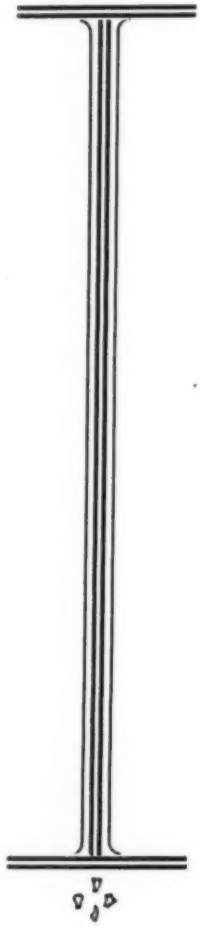
Out fishin'



A feller isn't thinkin' mean,
Out fishin';
His thoughts are mostly good and clean
Out fishin';
He doesn't knock his fellow men,
Or harbor any grudges then;
A feller's at his finest, when
Out fishin'.

The rich are comrades to the poor,
Out fishin';
All brothers of a common lure,
Out fishin';
The urchin with the pin and string
Can chum with millionaire an' king;
Vain pride is a forgotten thing
Out fishin'.

A feller gits a chance to dream,
Out fishin';
He learns the beauties of a stream,
Out fishin';
An' he can wash his soul in air
That isn't foul with selfish care,
An' relish plain an' simple fare
Out fishin'.

A feller has no time for hate,
Out fishin';
He isn't eager to be great,
Out fishin';
He isn't thinkin' thoughts of pelf,
Or goods stacked high upon a shelf,
But he is always just himself,
Out fishin'.

A feller's glad to be a friend,
Out fishin';
A helping hand he'll always lend,
Out fishin';
The brotherhood of rod an' line
An' sky an' stream is always fine;
Men come real close to God's design,
Out fishin'.

A feller isn't plotting schemes
Out fishin';
He's only busy with his dreams,
Out fishin';
His livery is a coat of tan,
His creed? to do the best he can?
A feller's always mostly man,
Out fishin'.

—By Edgar A. Guest.

Ravages of the Bookworm

By WM. R. REINICKE

Realization of the inferiority of our modern papers to withstand the ravages of decay has become keen enough to promote considerable discussion on the subject. It is a fact that for books and documents of other days, a century was not so destructive as a year is to many of them now. In these days we live so much in the present that the effect of a thing more often concerns us to a greater extent than its ability to endure. The author of the following article has given a lucid description of the habits of paper destroying insects. Who will be the one to make a paper that will withstand these ravages?—Editor.

DURING the past ten years I have devoted considerable time investigating the various kinds of insects found throughout the world which destroy or damage books and papers. I will not attempt to describe all the various species of insects which others and myself have discovered eating the books or ruining the binders, although at the present time I have a list of over 160 species, and am adding to the list continually, but simply describe some of the different ways in which books are attacked and a few of the species of insects which attack the books with a certain object in view.

Different species of insects have been named by various authors as the true bookworm. Prof. L. O. Howard, United States Entolomologist, names Sitodrepa panicea as the true bookworm, but if the title of "the bookworm" is to be the honor of the insect which causes the greatest amount of destruction, there are quite a number of other species which far outrank this species for the honor, if such it could be called, but personally I do not care to act as an umpire in making a decision.

The knowledge that books and papers are destroyed by insects is not of recent acquisition by any means; this may be proven by many references to this pest by ancient writers.

Austen, in his "Bookworms in Fact and Fancy" states that the earliest reference found in literature relating to the bookworm was rescued from oblivion by the lad, Salmasius, in 1606, when he discovered in the libraries of Counts Palatine, the manuscripts of the anthology of Caphalus. Among the fragments in this collection is one attributed to Evenus, the sopnist poet of Paros, who write about 450 B. C., a "little scorpion-like creature found in books," which was no doubt a species of Acarina or pseudo-scorpion, commonly called book-lice is spoken of by Aristotle. Ovid and Horace also mention the bookworm in their writings.

Pliny, who speaks of so many different subjects in his "Natural History," says very little about the insects, which no doubt have been the cause of considerable anxiety among the book owners of the ancient world.

Martial, who lived in the first, and Lucian, in the second century A. D., mention its ravages, and they are also spoken of by many of the other early writers and poets, but it was not until the publication in 1665 of Hook's "Micrographia," that an account, accompanied by an illustration, was given of the bookworm, that we begin to get some idea of the species of the insect which was supposed to destroy books. It is impossible from Hook's description to tell what species of insect he calls the bookworm, but the illustration shows that he is referring to a species of Thysaura or Collembola, known among laymen as silver-fish and spring-tails, but actually the damage caused by these small, swift-running forms of life is very small.

Leaves of book attacked by paper-eating insects

Heavy Destruction of Books by Insects

It is said that insects destroy more books in one year than are lost by fire and water combined, and from what I have read and seen during my researches, especially from the contents of letters from my correspondents describing the ravages committed in warmer regions, I see no reason to doubt this statement.

That this unceasing destruction continuing night and day, year after year, has been great enough to cause alarm as to partial or total loss of many rare tomes and collections, may be proven by the prizes offered at various times for a preventive. In 1774 the Royal Society of Gottingen offered a prize for this purpose, and the International Library Congress,

which met at Paris in 1903, did likewise and some of the various scientific bureaus of some of the governments have and are directing their efforts to prevent this never ceasing loss, but up to this time no satisfactory remedy has been offered.

In reading articles describing the destruction of books in different parts of the world by insects, one will notice that the authors almost without exception, state that the cause of the attacks is the attraction of the paste to the insects used in fastening the covers of the book to the printed pages, and most of the prizes offered ask for some poison to be mixed with the paste. If the paste is the only attraction, why is it that reams of paper with no paste whatsoever on the paper are riddled?

The reader will notice that although many writers state the manner in which the volumes are damaged; holes made through the bindings into the interior of the books, leather and cloth bindings ruined, glazed or coated surface of the paper gnawed, the pages of the books looked like ribbons, that that portion of the page which had received the impressions of the printer's ink only had been eaten, making the pages look as though the letters had been punched out, large cavities with tunnels leading from the cavity to various portions of the book, etc.; in no reference that I have read, has any writer given thought as to why the insect should spend many weeks making tunnels and cavities in the paper, seldom reaching the back of the book where the paste is, if they were after the paste only, but with all these ways of eating before them, simply use the phrase "they attack the books to get at the paste used in binding."

I have read over eight hundred of these articles, and have had the pleasure, from the standpoint of the researcher, but not that of the bibliographer, of examining many hundreds of books and lots of paper, old and recent dates of manufactured paper made of rags, rag and wood, papers containing mineral fillers, parchments, and bindings of cloth and leather, and seldom, in fact it might be called a great find, did I see a book where it could honestly be said that the paste was really the object of attack.

I also found cases of books in which cavities were found without a gallery to show the manner in which the insect obtained access into the interior of the book.

Comparing the various ways in which the insects attacked the books, and knowing from my studies that insects have wonderful instinctive powers, amounting to almost intelligence in some species, I came to the conclusion that there was something else besides the paste which attracted the small forms of life, and starting upon this theory, I divided the books into groups or classes, according to that portion of the book which was primarily attacked.

Paste Eaters

Although this has been given by almost every writer as the cause of the attraction to the insects, in all my examinations of many thousands of specimens, many of which were simply reams of writing or wrapping paper with no paste whatsoever in them, I have only found a few specimens where I was satisfied that the insects were primarily after the paste, a few beetles Tenebroides mauritanicus, Silvanus surinamensis, Calandra granaria, Tenebrio molitor and one moth Pyralis farinalis are the only species of insects of the many attacking books that could really be said to be after the paste.

Paper

Paper, which composes the greatest volume of the book, is made from linen, hemp, cotton, rags, various grasses, chemically prepared woods, wood not chemically prepared and other substances. In many of the cheaper grades of paper and paper used for newspapers, clay and other materials are used as fillers, amounting in some cases to a very large per cent of the total weight of the paper.

Paper Eaters

Wood Pulp—In this group will be found the following beetles: Apate capucina, Xestobium tessellatum, and Lyctus unipunctatus.

It is very interesting to the researcher, although the reverse to the owner, to note how the insects found in books made of wood pulp, make long running galleries, with larger cavities at intervals, in the same manner as they would do if they were working in the wood, or under the bark of a tree still standing in the forest. As every one knows, in the preparation of wood to be manufactured into paper, the logs are crushed by great pressure into small particles, eliminating entirely the veins found in the logs, therefore it is somewhat difficult to explain this, except upon the inherited instinct acquired through thousands of generations.

In other cases very large cavities are found, sometimes the size of a walnut, with small tunnels leading from the cavity into various parts of the volume.

The strawboard used some years ago, especially in foreign countries for the covers and covered with cloth, seem to have great attraction for some species of insects, some specimens of these boards being so covered with tunnels as to remind one of a model of a very mountainous country, the cloth being untouched except where a hole was made for entrance.

Rag Paper—As this paper contains a very large percentage of plant fibres, it attracts species of the Order Lepidoptera Moths, which are so destructive to plant life in their native state, Trichophaga tapetzella, Tinea pellionella, Tineola biselliella and Plodia interpunctella are among the insects causing the destruction of books containing rag paper.

Rag Pulp—In collections of incumbula, which were made of pure white rags, one will see some wonderful examples of insect work. In fact in many cases

these rare old tomes are so thoroughly cut into strings that they could not be opened without danger of all the contents falling like rolls of ribbon.

Mineral Fillers—The largest portion of the papers produced today have a large percentage of fillers in them and are subject to destruction by the group of insects which are known all over the world for their destructive habits, the Termites or white ants. They are found quite far north, and in the tropical regions their nests are so numerous and large that often at a distance they are mistaken for a village of the natives and there is nothing that they will not destroy. In one night they have ruined pieces of furniture, leaving only the shell in the morning for the owners.

That a very great amount of mineral filler is used in making paper today may be seen from the following: In Philadelphia in a damp basement while going over a lot of books I found two volumes of Congressional Records still in their original wrappings with here and there a hole in them. Investigation showed that the white ants had attacked these volumes and instead of there being two books I found two blocks of clay, containing white ant galleries and here and there part of a page of the record. The ants had really transformed the entire mass back into clay.

The alluvial deposits are natural to the white ant, and when clay or other mineral substances are used in paper, the ant's instinct telling it that it is the same as that which it has been accustomed to, it proceeds to cut its tunnels, especially if the atmosphere where the books are kept is somewhat damp, which is almost always the case in the warmer regions.

I believe that the greatest part of the destruction of books, outside of bookbindings, are caused by white ants, and that this loss will increase as more and more mineral fillers are used in the manufacture of paper.

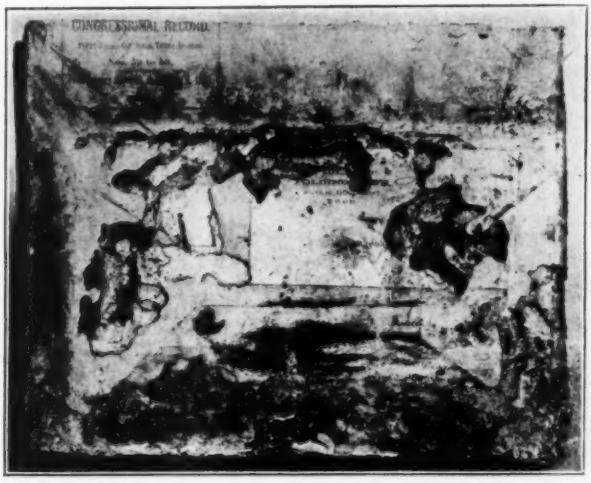
Parchment—The roaches are the great enemies of parchment, and this attraction is caused by the oils and fats used in their preparation. One will often find old books bound in parchment riddled with hundreds of holes, but investigation of the board sides will show them full of tunnels, and that the holes in the parchment covers were made by the insects in entering and leaving the wooden sides. Anobium serricornis and some species of Scolytidae are the wood boring vandals.

There are some species of insects which through evolution have accustomed themselves to eating almost anything, such as Sitodrepa panicea which is especially noted for its omnivorous habits.

Small forms of life are found upon books and papers, which have caused much speculation as to what substance they feed upon, and the insects commonly known as book-lice, belonging to the family Psocidae are examples. In turning over the pages of books, or looking over papers which have been kept in a dark location for some time, one with a keen eyesight will often see little specks of life run to a crevice to hide or get away from the rays of light. On account of their whitish gray color and an ability to run with a speed which is amazing when the size of the insect is considered, it is only the keen observer who will spy them as they scamper across the printed page or paper.

Bindings

Skin—Bindings made of skin always contain a certain amount of oily substance in them, even after tanning, and attract insects which live upon oils and fats. These bindings are destroyed by the following beetles: Lasioderma serricorne, Attagenus piceus and Anthrenus scorphulariae, the roaches, such as Periplaneta americana and Ectobia germanica, and crickets, Gryllus āssimilis.



Congressional Record volume attacked by white ants

Cloth—Books covered with cloth bindings are often found to look as if something had been used to suck the dye matter, especially is this the case with certain colors, and I think that the paragraph under inks and dyes will show beyond a doubt that it is the work of roaches.

Inks and Dyes—The fact that certain books had the part of the paper containing the impression of the letters eaten aroused my curiosity, and to see if it was really the ink that they wanted, I took some pieces of parchment, and with printer's ink, made margins along the four sides and diagonal lines from each corner.

Placing the piece of parchment in a can containing some roaches for a number of days, I discovered upon opening the can that the roaches had eaten the edges of the parchment covered with the printer's ink, and had started to eat their way up the diagonal lines.

Speaking to Mr. Thomas A. Bradley, president of

the Security Bank Note Company of Philadelphia, about insects and dyes, he told me that the working clothes of the employes of his company, if left hanging in a dark place for a time, were found to have been gnawed by some species of insect, and strange to relate, only that part of the clothing which had been stained with ink was eaten. Most inks contain one or more acids in their composition, and as they are claimed to be poisonous and therefore should kill, one would say that the parts colored by dyes and inks should kill, instead of proving attractive.

The proof that there was something in the ink which was necessary for their existence, which in the woods could most likely be obtained from plants, was further confirmed by my observations in libraries in Florida.

Bindings of certain colors were badly damaged within a few days after being placed on the shelves, whereas the books with bindings of different colors had been on the shelves for years without being attacked.

While the white ants cause most of the damage to the paper, the roaches are the great destroyers of bindings, cloth and leather.

Poems—The ravages of these little pests have been immortalized by the poets, both ancient and modern. From one to twenty verses being dedicated to him, according most likely to how the poet felt at the time. Even Robert Burns had to cease making his poems of love to pass to posterity a verse on the bookworm.

Favorable Conditions for the Bookworm

Heat is highly favorable for the propagation of these pests, especially if accompanied by dampness and darkness, and as a great many collections of books are in buildings where the book stacks are placed in dark portions of the rooms, badly ventilated, and the only light available as a rule is from gas jets or incandescent lamps, which are only lighted when needed. This darkness, the more or less damp air often found in these surroundings, the gases of various kinds in the air, and the fact that the books most seldom called for are kept in these locations, all combine to give ideal conditions for the growth of these small forms of life without much chance of their being disturbed during the period of their life-cycle.

Another thing to consider is this, that the eggs of most insects are very minute, and why should not some of their eggs, originally placed upon or laid in the living plant by the parent, have escaped being destroyed during the process of manufacturing, remained dormant, until such time as the proper conditions were given, and then proceeded with the next stage of its life, as though nothing in its environment had ever changed.

I remember as a boy, when I started to collect insects, that I was given a case to hold my specimens that had been kept dry in my father's store for many years. I took this case and placed it in a shed which was exposed to the changes in the atmosphere and from time to time added my pinned specimens. One day upon opening one of the drawers to add a specimen I discovered a specimen of a large species of woodboring beetle, but could not account for the manner in which it had obtained access to the cabinet, as a careful examination failed to show a hole in any part of the outside of the case. Upon pulling out the drawer, I found that the beetle had emerged from the piece of poplar wood forming the inside of the drawer, and that there was only a thin layer of wood over the cavity in which the insect had lain, dormant in its pupa state, no doubt for many years. Cases of this nature are constantly being noted, and the tenacity of bacteria under greatly adverse conditions is becoming better recognized every day.

Unfavorable Conditions for the Bookworm

Light and cleanliness are the two great factors in overcoming the ravages of the bookworms, and will also prevent another sort of damage to books, and that is, the various kinds of moulds which start to grow upon and in the books a short time after they have been in a dark, damp and warm location.

The lessening of the destruction of books that have been kept on shelves in badly-ventilated and badly-lighted libraries, after having been transferred to a new building having good ventilation and light, was ably illustrated some years ago by the experience of Mr. Ernest J. Reed, Librarian of Oaha College, Honolulu, Territory of Hawaii. He stated in a letter to me, that before the books were moved to the new building, that the whole collection was constantly being riddled by various species of boring insects, but that since moving to the new quarters there was comparatively little trouble from these pests. From an examination of books I have received from his library, I wonder how anyone was able to read the books with any degree of satisfaction, as many had hundreds of tunnels running through them, some had large cavities eaten in them, and others looked as though a mischievous boy had taken a pair of scissors and tried to see how many strips he could cut each leaf into; in others the cloth binding was almost entirely eaten off, exposing the galleries made by the beetle-larvae in the cardboard covers.

Books located in a place where the air is very dry and warm will be subjected to the ravages of **silverfish** which are naturally attracted by heat. They are seldom found where it is damp.

Remedies

I have tried many remedies, but much against my desire, have been forced to the conclusion that up to the present there is a great lack of knowledge as to

the resistance of these small forms of life to poisons, heat, etc., in their early stages.

Many letters from almost every country in the world have been received giving remedies, some claiming success, but most of them admitting failure; often what one writer claimed to never fail, was declared to be useless by others.

Even books treated with the strongest poisons, failed to produce the desired results. Experiments conducted by the United States Bureau of Standards, and also by myself, the roaches (the insects experimented with) produced their young as though nothing unusual was taking place.

This Bureau made a very exhaustive series of experiments, in an endeavor to obtain if possible, a binding material which would be protected from destruction or damage by insects, and also to withstand the effects of gas and light without fading, and this material was very kindly loaned to me by Dr. S. W. Stratton, the Director of the Bureau, for study.

The tests were made with ducks, cloths and buckrams of various colors. A part of each piece was chemically analyzed in order to discover what substances were used in their manufacture, and the remainder of each sample was then placed with the roaches for various numbers of days. The results when tabulated, proved that it did not seem to make any difference to the roaches as to what materials were used in coating the cloth, as they had nibbled all but one of the bindings. Next some of the samples were impregnated with a weak solution of quinine and others with strychnine, but these also failed to prevent the attacks; and, upon increasing the quantity of poison in the solution, the roaches seemed more attracted to the cloth than previously. Even corrosive sublimate proved ineffective. It is true that the insects died within a few days, but not until they had ruined the bindings. One sample, seeming to be exempt from their ravages, was selected and adopted by the Bureau as a standard, but afterwards it was discovered by Dr. Stratton, the Philippine Bureau of Science and myself in other tests, that even this buckram with such great promise, was not immune.

The Philippine Bureau of Science claims to have discovered a binding that is protected against the ravages of insects.

Although many experiments have been made to endeavor to obtain an insect proof binding, not much has been done towards protecting the most valuable portion of the volume, the contents.

There does not seem to be any part of the world, except perhaps the Arctic Regions where books are not in danger. I have seen two sheets of land records from India, which must have contained at least five thousand holes. Books in which large cavities, the size of walnuts have been made, other volumes looked like strings of ribbon. From the Philippine Islands bushels of paper snow flakes, which had once contained the records of the Spanish Government while in control of the islands, but I trust that some time in the near future, especially as today, more wood and mineral fillers are being used, that science will find the means of prevention, and save to the world, if not the books of the past, at least the publications of the future.

Waste in Box Board Mills

By RICHARD CLAYTON

WASTE means loss; waste means the loss of something which could be saved.

In box board mills the problem of waste prevention is a serious one needing continuous and careful attention from the fact that there are so many ways in which losses may occur.

The waste of time and material by careless and time-killing employes is one which may be corrected by efficient superintendents and foremen.

The waste of fuel in the power plant through imperfect combustion, low temperature feed water, or dirty boilers may be corrected by a diligent engineer.

The waste in radiation may be corrected by the proper covering of steam pipes and boilers.

The waste of power in the beater room can be lessened if the beater man can be educated to handle the rolls in the right way.

Waste heat from exhaust steam can be used for drying paper and heating the buildings.

The waste from trash received in paper stock (mixed paper) cannot be avoided.

The most serious source of loss in board mills and usually the one to which the least attention is paid is the waste water from the machines. I have seen sewers from paper mills lined their full length with valuable pulp and in places where they would overflow, the ground would be covered inches thick with it. The main idea seemed to be to get rid of it the quickest and easiest way; dump the vats, wash them out and let everything go to the river. I will say though that more attention has been paid to this loss in the last few years; ways of using this waste water have been devised, thereby saving what stock was in it.

Save-Alls

Save-alls are being put into use; a fat friend of mine up in Wisconsin makes a very good one. It is every one's patriotic duty to save pulp wherever pos-

sible in the mills, thereby conserving the fast diminishing supply of pulp wood. No matter how much money a mill is making, there is no excuse for wasting pulp. Save it all and put it back into paper.

The saving of waste water from the machines in any mill is not a very difficult or expensive job. The most efficient method that I have found and which I put into successful operation in a large box board mill was to drain or collect all waste water from the machines, stock pumps, screens, etc., in a central point (shallow well or sump) and deliver it by a centrifugal pump to a tank of large capacity, the beaters getting their water from this tank. There would be times when the beaters would not use all the water put into this tank, naturally causing it to overflow, which would mean some waste, but this overflow was taken care of by another tank from which a pipe led to the save-all, thereby saving it all. There were times when the save-all had nothing to do, but it was there and ready like a good catcher allowing no "passed balls."

By the above described arrangement the reclaimed pulp in the waste water is passed back to the beaters where it is mixed with fresh stock. The same disposition is made of stock reclaimed by the save-all.

Reclaimed water in the tank from which the beater room draws its supply can be easily kept hot by the proper arrangement of coils and the use of exhaust steam.

One of the objections to the use of a tank for waste water is that a large amount of stock settles there and must be emptied and washed out periodically. This, I believe, could be avoided by using a steel tank with a taper or hopper bottom, at least 60° taper, with the outlet to the beater supply pipe at the lowest point. There could then be no settling, everything going to the beaters. The saving of pulp by this method is not the only saving; there is a saving of fresh water and the power it takes to pump it. The saving of fresh water is a vital thing in some mills where the supply is limited.

The wastes in box board mills though numerous are not difficult to correct if manager and superintendent notice them and insist on their correction. "A penny saved is a penny earned"; the same thing applies to dollars.

Every box board mill has its own separate waste problem; all are different. Some are easily corrected, while some are not so easy. None, however, are so difficult but with some ingenuity it can be solved. In putting up a new plant, this saving of waste water should be included in the plans, when it could be done with slight expense.

One rarely realizes what is being lost through waste water until the evidence is before you. I can well remember when I first saw the save-all put to work, and the amount of good stock which came from it. Then I reflected at the years we had been letting all this water go to the river in blessed ignorance of the dollars that were going with it.

Pulverized Coal, Its Possibility in Paper Manufacturing

By RALPH GALT

Manager, Seattle Office, Fuller Engineering Company

BEFORE any new method forming a whole or part of a manufacturing process can be adopted, its reliability must become an established fact. The governing factor that then effects its general adoption is the ultimate economies resulting.

The use of pulverized coal for steam generation has advanced well beyond the experimental stage and may be considered as having fulfilled the first requirement. Its adoption in any particular case, therefore, should be governed by the estimated saving in dollars and cents that may be realized in a given plant under a given set of conditions. In what follows, an attempt will be made to bring out the principal points effecting the adoption of a pulverizing plant, and also sufficient examples to show where economies may result and to what extent.

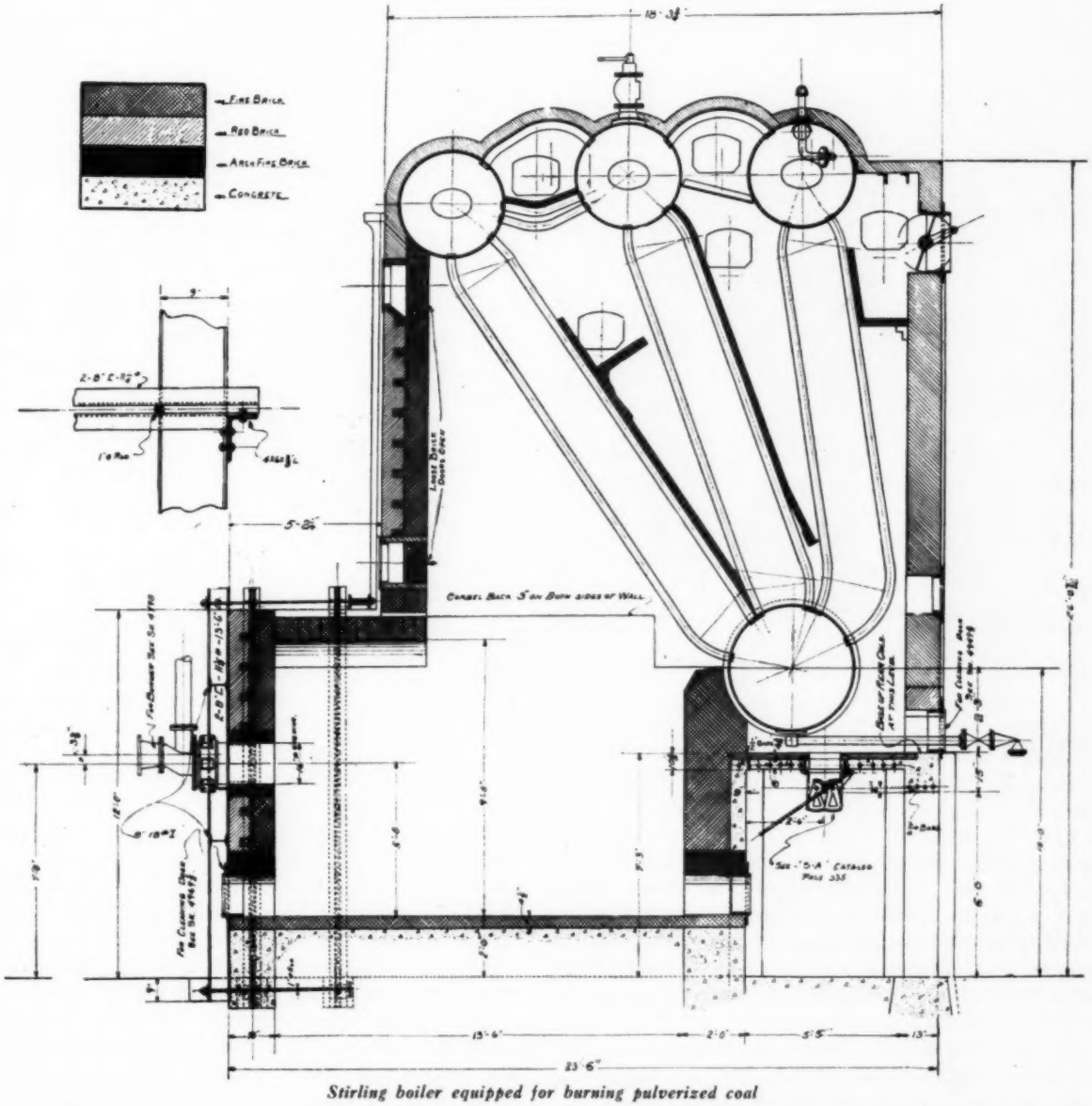
The British Columbia Sugar Refining Company's plant, which is a plant supplying pulverized fuel sufficient to take care of 5,000 horsepower has been in operation since February, 1919. The steam at this plant is used mostly for process work, and it is of the utmost importance that the supply of steam be uninterrupted for twenty-four hours of each day.

The steam plant is also called on to take care of very sudden demands for large quantities of steam with sudden interruptions. This calls for a very quick firing control or ability to meet and hold sudden high loads, or drop them suddenly as the case may be. This plant in operation has fulfilled these conditions as well as it previously had when operated with fuel oil.

High Ash Content

It might be of interest at this point to comment on the class of coal that was used to replace the fuel oil formerly used. This coal is an unwashed slack

which carries between 28 and 35 per cent ash and had never been satisfactorily used in any other method of firing. As a matter of fact, the colliery that furnished this coal had a large amount stored due to their inability to sell same, and, for this reason, it was possible for the sugar company to purchase it at a very reasonable price. The management of this plant state that they have entailed a saving of 50 per cent in their fuel bill since adopting the use of pulverized coal.



Stirling boiler equipped for burning pulverized coal

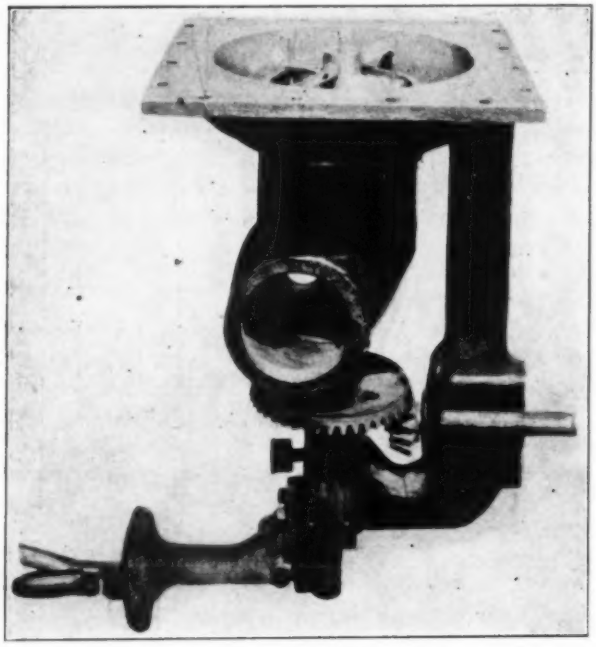
Originally difficulties were experienced at this plant due to the high ash content of the coal principally on account of short boiler stacks. To overcome this difficulty the induced draft fan in use was changed to one especially designed to remove ash from the flue gases, and now this fan is removing the principle amount of ash from the stack gases. The ash thus removed as well as that from the boiler setting is handled through sluice ways and into the bay nearby.

With any other method of burning coal than in pulverized form, the percentage of ash has a very noticeable effect on the efficiencies that may be obtained. However, when the coal is burned in pulverized form the thermal efficiencies that may be obtained are independent of the ash content, if proper provisions are made for keeping the boiler tubes clean. This statement is borne out in the fact that the sugar company was able to obtain boiler and furnace efficiencies as high as 83.3 per cent using the high ash coal referred to in the foregoing. It would not be reasonable to expect much higher efficiencies than this, using even high grade coals. It may be further stated that ef-

ficiencies as high as this may be obtained using lignite coals, and that these efficiencies may be maintained in continuous operation.

Use of Lignite Coals

The use of pulverized fuel should be particularly interesting to a large number of paper manufacturers located in Canada and on the Pacific Coast, due to the fact that there are large deposits of lignite coals in these territories. These lignites or other local coals may be used to replace higher priced fuels that



Pulverized coal constant speed feeder

are now being used and in some instances being shipped in from considerable distances entailing high freight rates.

In many instances, it would be possible to use local coals in place of fuel oil with a considerable saving in the fuel bill. It is logical to conclude that the increasing demand for gasoline, lubricating oils and lubricating grease will continue to affect the price of oil, and that the time is not very far off when fuel oil will be out of the question, and it will be necessary to find a substitute.

Recent developments in the transportation of pulverized coal make it possible to locate the pulverizing plant at a point most convenient to receive the coal. The coal may then be prepared and pumped through small diameter pipes to the boiler bins. It is quite practical to have the boiler plant located even a thousand feet or more from the pulverized coal plant, and at a different elevation.

The method of conveying referred to is the Fuller-Kinyon transport system. In this system the coal is forced into the transport line and aerated, and in its aerated condition caused to flow to the desired point of discharge. By means of switching valves the coal may be diverted from the single line to any desired point throughout a given plant.

Equipment

A brief description of the equipment necessary in a pulverized coal plant consists in general of a hopper or other suitable means for receiving the coal. If slack coal is used, it is as a rule not necessary to crush same. Larger sized coal requires the installation of a crusher. The type of crusher usually used is the single roll type. The coal is then elevated to a storage bin and fed to a drier. The drier is of the indirect fired type, that is, one in which the flame does not come in direct contact with the coal. The dried coal is passed to a storage bin. The coal then passes from the pulverized coal storage bin to a pulverizer. Two types of pulverizer may be used, either the air separator or the screen type. The type to be preferred should be decided upon after due consideration is given to the governing factors in a given case. When other consideration does not prevent its use, the screen type of mill is the most economical in operation from both power and maintenance standpoint, and makes possible a more compact plant.

The pulverized coal may be taken direct from the mill and pumped to the boiler bins, or it may be deposited into weigh scale bins, and then pumped to the boiler bins.

The equipment in the boiler plant consists in general of coal storage bins, feeders and burners.

The screw type of feeder has been in general use and has given satisfactory operation. This feeder required a variable speed drive to regulate the rate of feed of fuel. This, however, has been improved on and a constant speed feeder, which has given satisfactory results in operation for close on to one year, is being adopted. The horsepower required for this feeder is very low. A one-quarter horsepower motor is usually used as a drive. The principle features in connection with the feeder are the facts that it is operated at constant speed, that it cannot flood and that it can not stall, due to an interruption of the air supply carrying the coal to the furnace.

Burners may be divided into two types, that is those arranged for vertical firing and those for horizontal firing. The vertical type is usually used where low volatile fuels such as anthracite and coke breeze are to be fired, and the horizontal type where the higher volatile fuels such as semi-anthracite, bituminous, and lignites are to be made use of.

The net saving due to higher efficiencies obtainable, and also the possibility of substituting a cheaper fuel are the points which will determine whether or not the installation of a pulverized coal plant will make a profitable investment. If the plant under consideration already has a boiler plant that has been in operation, it is usually a relatively easy matter to determine what its present fuel costs are and what

the cost of operation is. These costs may be compared with the savings that will result due to higher efficiencies and also the difference in the fuel bill due to the possibility in some cases of using a cheaper grade of fuel. From the comparison of the two, it will be quite an easy matter in any given case to determine whether or not it will be advisable to make the investment necessary.

The following items should be considered in making this comparison:

First—The cost of raw coal at the plant.

Second—The amount of coal to be used.

Third—Investment necessary for drying and pulverizing plant and boiler equipment.

Fourth—Costs per ton for operation of coal plant.

(b) Power costs per ton for preparing coal.

(c) Labor costs per ton.

(d) Drier fuel costs per ton.

(e) Repair costs.

Cost of Raw Coal at the Plant

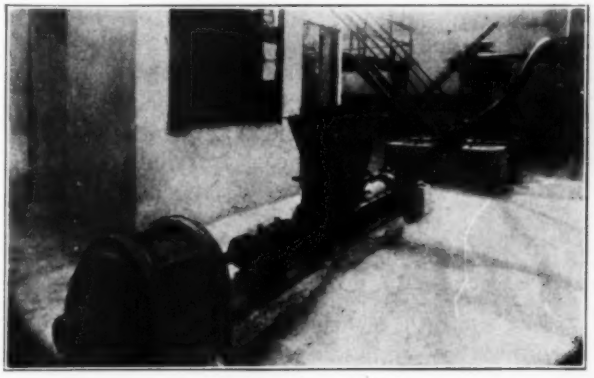
This is the most important item to consider as in many localities there are mines that are wasting coal at the present time that would make an excellent fuel if dried and pulverized. This is especially true at the mines where coal is washed and no effort is made to recover the really fine sizes. Often this coal amounts to 15 or 20 per cent of the mine's output. With little expense this coal could be washed, if advisable, in jigs or on tables and the resultant product could be sold at about one-fourth the price of this same mine's regular steam coal. It would give the mine a fair profit and the purchaser a coal of as great a heating value as that of the regular steam coal. The amount of moisture in the coal should be a consideration especially if the freight rate on same is high. It is therefore advisable to study the coal situation.

Amount of Coal to Be Used

This can be determined by finding the B.t.u. value of the coal to be used and ascertaining the boiler efficiency that can be expected. For an up-to-date water tube boiler installation, a minimum boiler and furnace efficiency of 80 per cent should be easily obtained. For horizontal return tubular boilers, an efficiency of about 70 to 75 per cent. If the amount of water evaporated per hour is not known, it is quite easily determined by test. With the B.t.u. value of the coal, the efficiency and the amount of water evaporated, the amount of coal necessary to operate plant can be determined. This amount of coal should be figured as coal received at the plant, or, in case that it is figured as the amount of pulverized coal, necessary allowances should be made for the amount of moisture removed in the process of drying.

Investment in Drying and Pulverizing Plant and Boiler Equipment

The cost per ton of this investment is dependent upon the amount of coal used. A drying and pulverizing plant that would produce twenty tons per day would cost approximately $50,000 or $2,500 per ton. A plant that would produce one hundred tons per day would cost $100,000 or $1,000 per ton. Whereas, a plant that would produce one thousand tons per day would cost approximately $350,000 or $350 per ton. The cost of equipping boilers is also proportioned to the capacity of each boiler as, for instance, to equip a one-hundred horsepower boiler it would cost approximately $2,000 or $20 per horsepower. To equip



Fuller-Kinyon pulp and transport lines ready for weigh bin

a five-hundred horsepower boiler would cost $4,000 or $8 per horsepower. The cost of equipping a one-thousand horsepower boiler would be $7,000 or $7 per horsepower. These costs of equipping boilers are dependent to a great extent on the amount of furnace changes necessary.

Costs Per Ton for Operation of Coal Plant

The power costs per ton for preparing coal are uniform and figuring that the cost of one kilowatt is one cent would amount to between fifteen and twenty cents per ton. The labor cost per ton varies as to size or type of plant. These costs in a plant of twenty ton per day capacity would average approximately thirty cents per ton. In a plant of one-hundred tons per day capacity—sixteen cents per ton, and in a plant of one-thousand ton per day capacity, six cents per ton. The drier fuel costs per ton are directly dependent on the cost of the coal used in firing the drier. An efficient drier will evaporate six pounds of water per pound of coal fired. Repair costs vary with the quality of coal being prepared and average between six and twelve cents per ton.

To illustrate the above, we will consider that a boiler plant is to be operated at an average load of 2,500 horsepower per hour per twenty-four hour day. In making a comparison between a stoker and powdered coal installation, assume the boiler efficiency obtained with the stokers to average 70 per cent, and that with pulverized coal, 80 per cent. The coal used on stokers is regular steam coal of 11,000 B.t.u. value and its assumed cost $4 per ton at the plant, and that the coal for pulverizing is the same quality of coal

only of a smaller size, and perhaps a product that had previously been wasted at the mines, or perhaps a lignite, and its assumed cost $2 per ton. To produce 2,500 horsepower per hour, 24 hours per day, with stokers would require 131 tons of coal, and with the pulverized coal installation, 115 tons per day. The cost of preparing the pulverized coal would be approximately forty cents per ton exclusive of interest and depreciation charges on plant investment. We have not considered this charge, as there would be a similar charge in the cost of stokers of about the same amount, and, in addition to that, we have not considered the fact that there is a cost entailed in the handling and preparation of the coal for the stokers. Also, that the labor costs in the boiler room would run higher in the case of stokers than with pulverized coal. With the cost of the coal for pulverizing at $2 per ton, and preparation cost of forty cents per ton, the 115 tons of coal would amount to $276, whereas the 131 tons of coal for stoker use at $4 per ton costs $524, or a saving of $248 per day in this plant's fuel cost. In this particular example, this amount would about pay for the cost of the pulverized coal installation in one year's time.

The application of pulverized coal to boilers has increased very rapidly in the last few years. There is close to a total of 100,000 rated horsepower installed at the present time. This in itself should be sufficient assurance that this particular feature in the application of pulverized coal has passed well beyond the experimental stage, and, further, that there is considerable to be gained in making an application. There are sufficient reasons for every power plant engineer investigating his own installation and determining for himself whether or not his present fuel bill and operating costs cannot be materially reduced.

Moisture Testing; What About the Man?

By T. LINSEY CROSSLEY

IN SEEKING to establish a standard for moisture testing, are we not focusing too much on the method and too little on the man?

Can it not be truthfully said that most of the troubles in moisture testing have arisen because the work was left in the hands of unqualified persons? First, persons in mills with no idea of the importance of their office, and employed by people who had no idea of such importance, and, secondly, persons with scientific training, but no idea of pulp mill conditions, suddenly asked to act as referees.

Recent trend toward excessively finicky detail is not likely to improve the conditions.

The line of endeavor should be toward simplification.

The form of test that can be made in the simplest and quickest way, and get correct results in the shortest possible time should be the aim, not the perpetuation of any particular form of test.

The idea of limiting the making of referee tests to individuals with certain qualifications is good, but among those qualifications should be that of actual experience in mills.

The attitude should be that of the surgeon approaching an operation for which there is a well known technique, but which is always governed by the circumstances and by the idiosyncrasies of the patient. No surgeon would agree to standardize an operation, and no referee should be required to make standardized tests, but all referees should be informed as to previous work on the subject and the circumstances of the present case, otherwise they become mere machines, and the mills would save by employing any honest handy man.

The case is different where no referee is called in, but in these again the facts are wanted and may be obscured by a dictum as to the use of this or that form of test. In such a dispute the agreement in result of two differing forms of test would tend more to a satisfactory settlement than concordant figures obtained by repetition of an identical procedure.

An instance in each case can be cited.

In the first example, that of an unqualified referee, the material was in 500-pound bales of dry sheets. They were tested by the usual man and found short. The mill's chemist then tested in a different way with the same result. A claim was made and the shipping mill sent a man from a firm of analysts who had no mill experience. He arrived without notice in the absence of the chemist, broke a number of bales over the room, cut wedges with bases four to eight inches wide, and, ignoring the fact that the pulp had been shipped about two months before and had stood for some weeks in a well ventilated wareroom, did not reweigh any part of the shipment but based his calculations on the shipper's gross and claimed to have confirmed the invoice. The consignee accepted his results and paid his fees and expenses to avoid further trouble because the referee had made a "standard wedge test." If the chemist's advice to fight it out had been taken, it would have been brought out that the wedge method was not standard for dry pulp in sheets, and had been found faulty for this work by one of its originators,* who

* R. W. Sindall, "The Sampling of Wood Pulp," pamphlet, published by Thomas Poulter and Sons, London. On page 10, referring to tests on dry pulp in sheets, is the following: "It was found that the first method, of cutting wedge-shaped pieces, invariably gave too low a percentage."

had devised the method for a very different class of pulp and package.

In the case in point the referee prejudiced his whole case by not weighing his test bales or reweighing the carlot, which had stood in an open room for weeks in which case the bases of his wedges would represent the portion most likely to be affected, as being the exposed edges of sheets.

A case of the other kind can be cited in which two mills made tests in the same way and were quite satisfied until a third mill made the test in a different way and was able to demonstrate the weakness of the test made by both other mills and incidentally made good on a heavy claim.

By all means let us get at the facts regarding the moisture test, and put them on record for guidance, but let us not be in too great a hurry to shackle our referees.

Sulphite Digesters for Direct Cooking

By HARRY E. WESTON

Instructor in Pulp and Paper Chemistry, New York State College of Forestry

DIGESTERS used for cooking wood chips by the sulphite process are usually vertical steel cylinders with conical tops and bottoms. In some cases horizontal rotary digesters are being used in the Mitscherlich process.

Many factors enter into the proper construction of a sulphite digester. (1) The digester must be so built that the materials used in its construction will resist the chemicals used in the process. (2) It must also be able to withstand the steam pressure to which it will be submitted during the cooking period. (3) It must be able to withstand unusual strains and stresses caused by its alternate filling and emptying and the extreme changes of steam pressure. This factor, known as the "breathing spell," has presented many engineering difficulties.

The essential features of a digester and auxiliary equipment necessary for the proper cooking of wood are as follows: 1. Shell; 2. Lining; 3. Head; 4. System of pipes for filling digester with acid. 5. System of pipes for supplying the steam for cooking. 6. The relief line-system of pipes for getting rid of acid gas. 7. The thermometers for ascertaining temperatures of cooking. 8. Gauges for recording pressure. 9. The blow valve. 10. The blowpipe through which the pulp is discharged under pressure when the cook is complete.

Shell

A sulphite digester is usually built of flange steel which conforms to specifications of the American Society for Testing Materials, and with the tensile strength varying as is necessary to conform to boiler rules encountered in different localities. The steel plates used in digester construction range from 7/8" to 1¼" in thickness. Triple riveted joints are common. Ordinarily digesters are completely assembled and bolted up in the shop, distinctly marked, and then taken down for shipment. Small sulphite digesters are shipped from the shop completely riveted and ready to install. After a digester has been finally erected and riveted at the plant it is tested under hydrostatic pressure. This pressure is usually 1½ times the working pressure. Cuts 1 and 2 show the building of a 15-ton sulphite digester.

Welded joints are being attempted in sulphite digester construction. As yet, very little success has been had with them in any large digester installation.

The outside shell of the completed digester should be kept clean—free from liquor, etc.—and should be painted. As an additional safety factor, sulphite digesters are not covered with asbestos or other insulating material.

Lining

Due to the corrosive action of the sulphite cooking liquor on iron, many futile attempts were made to overcome this difficulty. It was the non-development of a satisfactory lining that prevented Tilghman, the inventor, from perfecting his sulphite process. In fact, a suitable material was not found for a number of years after the Tilghman patents were issued.

Lead, the best material to resist the acid from a chemical standpoint, was first used as a lining for the digester. It was experimented with in several different ways, first being used as an endless lining inside the digester, then as a lining on each steel plate, and finally as a facing for bricks. Failure resulted from all of the attempts. Ideal conditions would result from having a lining with exactly the same coefficient of expansion as the steel shell. The high temperature maintained within the digester caused the metals to expand on heating, and to contract on cooling. Since the coefficient of expansion of lead was so much greater than that of steel, a constant uneven stretching and contracting of the metals occurred during the operation of the digester. Lead, due to its soft yielding nature had a tendency to creep. This creeping caused a buckling and blistering of the metal so that it quickly lost its elasticity and became brittle.

The sulphite process was held in abeyance for a

number of years and it seemed doomed to failure. However, research was going on at all times. Bronze digesters were tried but were considered unsatisfactory since the acid corroded the bronze quite rapidly.

Attempts were then made to build linings of acid-resisting stone blocks and cement. This type of lining has gradually developed until today practically all sulphite digesters are lined with acid-proof brick, a goal which was reached after a great deal of practical experimentation.

A number of methods are used for laying the brick. Ordinarily two layers of brick, separated from the shell by a 1" layer of Portland cement, are used. The two layers of brick are also separated from one another by a thin layer of cement. Another method consists in coating the inside of the shell with cement, quartz, and sodium silicate to a thickness of 1" to 1½". Then the acid-proof brick is set in a jointing of litharge, quartz and glycerine. The plastering mixture is made up of cement and quartz with enough sodium silicate to make it set as fast as it is pasted onto the shell. The grouting consists of one part cement and one part of quartz mixed with sufficient water to make a thin paste. The jointing mixture is a thick paste made with water, one part of cement and one part quartz; or a thick paste with glycerine of one part of quartz and one of litharge. The litharge and quartz should be of the best quality. After the bricks are laid they should be allowed to set firmly before the digester is brought into use. Then the digester can be gradually brought up to cooking pressure; 24 to 36 hours should be taken to accomplish it. Proper precautions are necessary when starting a digester with a new lining because of the liability of its cracking and thus straining the shell.

There are a number of bricks on the market especially adapted for sulphite digester lining. Such bricks are hard, homogeneous, and non-absorbent to water. It is necessary that such bricks be thoroughly baked and well annealed so that they may resist the high temperature changes brought about in the cooking process. They should be free from substances that are attacked by acid. Even the best bricks will split and crack to some extent because of the drastic treatment to which they are subjected in the digester.

Head

The head or cover of the digester is removable. It is held in position by a number of clamps and is moved when necessary by means of levers or chain hoists. The inside of the cover is always lined with an acid-resisting metal, such as lead. The cover is removed after the blowing of each cook to allow refilling of the digester with chips and acid. Cut No. 3 shows very clearly the method of attaching the cover to the digester.

System of Pipes for Filling Digester with Acid

The acid supply system is made of pipes of such size as to fill the digester as quickly as possible. The pipe line conducting the acid to the digester must be of hard lead or bronze so as to resist the corrosive action of the acid. Pipes 6" to 8" in diameter, manufactured from antimony lead or lead containing about 8% of antimony in its composition, are often used.

Acid may be run into the digester either through the top or bottom. Many mills seem to prefer the top method. In this method an acid resistant pump is frequently inserted in the acid line between the storage tanks and the digester. Some mills have their acid tanks so arranged that a pump is not needed, and the acid flows into the digester by gravity. When acid is pumped into the bottom of the digester it gradually rises up through the chips. Very little trouble is caused by flotation of chips. More chips can be placed in a digester in which the acid enters at the top than in the case of one in which the acid enters at the bottom. This is due to the packing effect when the acid runs into the digester. However, the decrease in yield in a digester that is filled with acid from the bottom is more than offset by the time saved, since it is possible to begin the acid flow into the digester a short time after the chips have begun to flow in from the bin. When filling from the top it is necessary to wait until the digester is filled with chips before starting the acid flow. When digesters are filled from the bottom, the fumes, so common in many of our digester rooms, are practically eliminated. A well-known apparatus for bottom filling is the "Dooley Acid Filling System." In this system the acid is put into the digester through a copper steam line. A suction pump is inserted in the acid line and special valves are used in the piping installation.

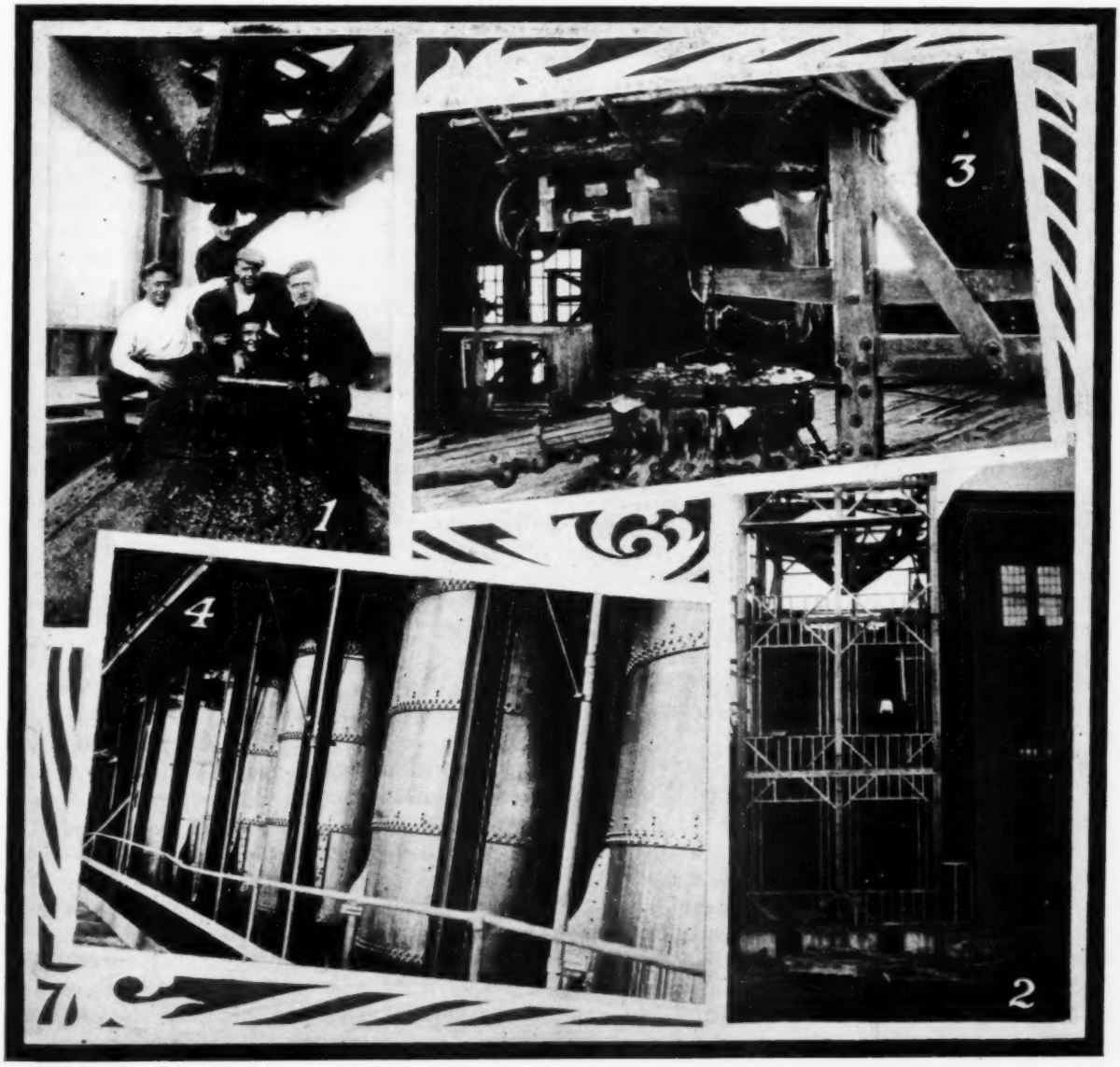
System of Pipes for Supplying the Steam for Cooking

The steam supply enters the digester at the base. The steam pipe is carried up to a point near the top of the digester and then down again, entering the digester at the bottom. This arrangement permits the location of a reducing valve on the working floor and is thus under the observation and control of the cook at all times. The line should be safe-guarded by check valves in order to prevent any of the contents of the digester being forced back into the boilers. All pipe connections between the boiler house and digester house should be as short as possible, thus aiding in reducing the amount of condensation which is so common in long steam lines. Traps should be provided in the lines wherever necessary, and all pipes should be covered with an efficient heat insulating material. The steam main must be of sufficient size to supply live steam to all digesters at the same pressure. If this is not possible it is best to use individual steam lines for each digester. The pipes are usually of wrought iron or copper, depending on the method used for filling the digester with acid. The side outlet of a bronze Tee is attached to the bottom of the digester. The steam line is connected to one end of

the Tee in such a way that the direct force of the entering steam is reduced. At the same time a better circulation of acid within the digester is created.

The Relief Line

This line consists of a system of pipes for getting rid of acid gas. In most cases the head is fitted with a connection to the relief line. Strainers must be provided to fit the digester at the place where the relief line enters so as to prevent the line from plugging with pulp or unsoaked chips. The strainers are usually made of hard lead or bronze, and their shape depends on the method of attachment to the digester. In any case they are provided with numerous holes about $\frac{1}{16}$" in diameter. The relief line is usually a $2\frac{1}{2}$" bronze pipe which, as mentioned, projects into the digester through the head or cover and is designated as top or cover relief. This line is very clearly shown in Fig. 3. A second system of pipes is often used on large digesters. This line is also of bronze, and is attached to the digester proper about $\frac{1}{3}$ the way down from the top and is designated as "side relief." The relief line at the top allows air and gas to escape while the one at the side is a relief for surplus liquor. The top relief line is often divided into two separate lines after leaving the digester. One is designated as the "liquor" and the other as "gas relief." The SO_2 gas which is driven from the liquor by heat collects in the top of the digester and escapes through the gas relief line to the recovery system and is there absorbed by new acid. Heat expands the acid in the digester, condensation of steam also takes place and dilutes it. This increases the volume of the original liquor which must be relieved through either



Figures 1 and 2—The building of a sulphite digester. Figure 3—Method of attaching cover to the digester and location of relief line on the neck of it. Figure 4—Line of sulphite digesters with supports.

the side or top liquor relief lines, or through both. The manner in which this liquor is removed depends on the method of cooking.

Liquor drawn near the beginning of the cook is sent to the relief coolers and then to the storage tanks to be used again. Liquor drawn near the end of the cook is sent either direct to a sewer, or to a separator and then to the sewer. The separator is a small tank containing steam coils heated by superheated steam which drives off the remainder of the free SO_2 in the weak liquor. This SO_2 is returned to the recovery system and the remaining liquor goes to the sewer.

In operating a digester controlled only by a top relief the cook must watch the relief lines very carefully and by proper handling to the valves direct the passage of gas and liquor into their proper lines. The side relief and top relief combined have an advantage over the top relief alone in that liquor only is relieved from the side which allows more dry gas to be recovered through the top relief line. It is generally considered more difficult to properly control a digester equipped with side relief and for this reason it is not used in some mills.

The relief coolers through which the liquor and gas pass consist of a series of lead pipes covered with cold flowing water. In many cases these coolers are very similar to those used for cooling SO_2 gas from the sulphur burners.

The Thermometers for Controlling the Temperature of the Cook

To regulate and properly control the advancement of a cook, one recording thermometer and two gauges are necessary. If the old type thermometer is used, it is inserted in the head of the digester, and readings are taken by the cook at frequent intervals. The recording thermometer, on the other hand, has its bulb inserted through the shell and lining about one-third the way down from the top. Due to temperature being such an important factor in the cooking of sulphite pulp, nearly all mills are equipped with recording thermometers. They are either of the pyrometer type or else electrically operated. The recording portion of the instrument is located on the digester room floor either near the head of each individual digester or else on a board with several others from different digesters. In either case all the gauges may be easily watched at all times.

Pressure Gauges for Recording Both Steam and Gas Pressure

Pressure gauges are also located near the recording thermometers. They are usually of the recording type even though in some mills the old type of gauge is still found. Two pressure gauges are sometimes used for each cook. One gauge records the steam pressure on the digester steam line which the other records the steam pressure plus the gas pressure due to SO_2. The gauge which is used on the digester records the actual pressure within, and it is easy to calculate the steam and gas pressures from it by the use of a "Saturated Steam Table" in which the pressure of steam at various temperatures is given.

The Blow Valve

The blow valve is located at the base of the digester and is connected to one end of the bronze Tee through which the steam enters the digester. Usually it is made of bronze and is ordinarily equipped with a cast steel door yoke which can be quickly opened, and through which a disc may be removed. These valves are commonly made in two styles—standard and straightway. The standard has a stem keyed to the hand wheel and turns with it. The straightway has a full-sized passage through it. The hand wheel carries a nut, arranged on ball-thrust bearings, which turns on the stem and is very easy to operate. Both of these valves are in common use in many of our mills. Various other types are also used.

The Blowpipe

The blowpipe is connected with the blow valve to the blow pit. It is ten to twelve inches in diameter and is of cast iron. The blow pit should be so arranged in connection with the digester that there would be as little wear on the blowpipe as possible. Digesters are blown under considerable pressure and serious injuries might result from the bursting of the blowpipe.

The sizes of vertical digesters are now more or less standardized. The number of digesters in an installation must have sufficient capacity to supply the demand of the mill. Corcoran in his work on sulphite digesters gives a table in which the capacities of digesters range from 1.33 tons of fibre to 23 tons of fibre. A ten-ton digester seems to be a standard size with many mills. Such a digester is approximately 15 feet in diameter, 42 feet in height, and has a lining 10 inches in thickness. Various authorities have given 480 cubic feet as a fair estimate of the boiler space required per ton of pulp after deducting the thickness of the lining.

Vertical digesters can be made in any desired length. They are usually supported by either cast iron or steel framework as shown in Cut No. 4.

The horizontal digester is of such little importance to the American sulphite industry that it requires no discussion in this article.

The sulphite digester, although not an unusually complicated piece of equipment, is much more so than the ordinary type of digester used in the soda or sulphate industry. Good material and good workmanship are necessary in all digester construction. Careful inspection and repairing are essential and no attempt should ever be made to conceal any flaws from insurance inspectors since their advice in regard to safe pressures, repairs, etc., is very valuable and should be well taken in order to reduce the hazards of sulphite cooking to a minimum.

Cost, Co-operation and Diplomacy

By CHARLES H. MARTIN

Auditor, Kalamazoo Vegetable Parchment Co.

THE necessity of securing accurate information from the source, be it in the rag room, beater or machine room, or, in fact, any of the various departments contributing to the manufacture of paper or any of its constituents, is self evident.

One of the most important problems confronting the cost accountant is impressing this acknowledged fact upon those in charge of various departments.

There are few ways to secure facts but many ways of gathering information and data which are absolutely of no value except to mislead. It falls squarely upon the shoulders of the cost accountant to so train his "lieutenants" in the mill that he may be assured of the accuracy essential.

The average paper mill superintendent is a manufacturing man, skilled through experience to make the best paper at the greatest available speed. His knowledge of "costs" is limited, his conception of figures being a collection of characters devised to keep track of how many hours in a tour, a day and a week in order that the pay clerk may figure how much money is due to everybody for services. This holds good in a great many cases until the propaganda of the cost accountant has had time to bring home the bacon.

The superintendent and mill clerks are all human beings. They have a heart that will function and a brain each that is capable of absorbing many things. The cost accountant, no matter how arithmetically proficient, must know his men, their peculiarities and devise ways of winning not only their interest, but to handle them in such a way that they will become, in action and in deed, dependable assistants.

A child balks at an order given by a high-strung, nervous mother for the simple reason it senses opposition and expected unpleasantness. We are all children at all ages, when we meet so-called "workmates" that are possessed with more mule than the average.

A cost accountant, who is entitled to class himself as such, knows who likes to be called "Jack" and who likes "mister" attached to the morning greeting, he knows where a joke will get facts and where a straight from the shoulder question will produce more results. It is his duty to so study each source of supply in the mill, that he may return to his office with a hundred per cent facts in his possession and leave in return a pleasant remembrance in the minds of each person that he comes in contact with, that will register "There's a guy from the office that's a regular skate." It is absolutely essential that the good-will of the factory workers must be won and kept. This along with a little tact in training those who supply reports, will work out to perfection.

Does it take the average cost accountant more than five minutes to estimate very closely the hundredweight cost of a grade of paper after the proposed formula has been presented to him. It shouldn't, provided he has previous dependable records to rely upon.

GRADE MONTH 192__

Machine	Material Price Cwt.	Cost Per 100 lb. paper	Normal Cost Per 100 Lbs.
PULP—Bleached			
Unbleached			
Soda Pulp			
Glendale			
K V P			
Shavings			
Broke			
Cotton Linters			
HALF STOCK			
Thirds & Blues			
Overalls			
Filler			
Glue			
Alum			
Rosin			
Color			
TOTAL MATERIAL PER 100 LBS. PAPER			
Direct Labor			
Indirect Labor			
Supt. & Mill Clerks			
TOTAL LABOR COST PER 100 LBS. PAPER			
Coal			
Power			
Mach. Clothing			
Mach. Expense			
Packing Supplies			
Finishing Expense			
Truck Expense			
Misc. Expense			
Overhead			
Administrative			
Office			
Selling			
TOTAL EXPENSE PER 100 PAPER			
TOTAL CWT. COST			

————lbs. made
————lb. rate per 24 hours
————normal rate
Formula used————

Form 1

Does it take the average cost accountant more than five minutes to estimate very closely the hundredweight cost of a grade of paper after the proposed formula has been presented to him. It shouldn't, provided he has previous dependable records to rely upon.

This is the day of the cost accountant. With prices dropping almost daily on sulphite, rags, soda, etc. prices seemingly high today are low tomorrow. His worth is shown by his handling of this situation.

It is true indeed that when he has arrived at an estimate which is nearly accurate, the result of his effort may be entirely disregarded and a selling price quoted, regardless of cost, in order that the mill may run and the organization, which has taken perhaps years to perfect, may not be broken but held together

until such time as they are functioning normally again.

It is a crime that so many mills are selling goods below cost for the very fact that they do not know what they are doing, and don't wake up until they close their doors to meet their creditors' bills on a percentage basis. The sooner we can get our competitors working along correct, consistent, intelligent lines and eliminate ignorance, then and only then will the master paper maker come into his own and the profits of the efficient will prove that they are such.

The cost accountant who is proficient in his chosen work can and does increase production. He knows the record of the paper machines, their possibilities and just how much good paper can be made upon each machine.

The superintendent cannot always be watching the tachometer or counting the revolutions of a dryer roll and just a well-timed hint from the cost man that "The machines have a tired feeling" or something of the nature, put over with a smile, sometimes will be just the dig required to put across that extra ton of paper daily that means more than the accountant's salary in the profit realized.

The "Clearing House" is located at the "Accountant's" desk. He is the recipient of "facts and figures" from every department of the establishment and after he has digested, analyzed and compiled all the material that has fallen into the "business melting pot" and has removed the scum, separated the meat, he is now ready to serve each and every department with records that are indispensible and essential to efficiency.

With a cheerful disposition he can ofttimes annihilate that which might become a riot or a strike

PAY ROLL RECAPITULATION SHEET

WEEK ENDING _____ 19____

PAY ROLL NO._____

DIRECT LABOR:		
Paper Mill:		
Rag Dept.		
Washers		
Beaters		
Machines		
Finishing		
Total Paper Mill Direct		
Pulp Dept.:		
Wax Dept.:		
Print Shop		
Machines		
Cutters		
Re-winder		
Trim and Seal		
Shipping		
Total Wax Dept. Direct		
Parchment Dept.		
Machines		
Cutters		
Print Shop		
Re-winder		
Trim and Seal		
Shipping		
Total Parchment Dept Direct		
Excelsior		
Specialties		
Glendale		
Total Direct Labor		

INDIRECT LABOR:		
Departmental:		
Glendale		
Paper Mill		
Roll Gang		
Roustabout		
Wax Dept.		
Roustabout		
Parchment Dept.		
Roustabout		
Welfare Hall		
Total Dept. Ind.		
General Indirect:		
Power		
Watchmen		
Machinists		
Millwrights		
Repair Gang		
Construction		
Shipping		
Box Shop		
Truck Drivers		
Stockman		
Janitress		
Roustabout. W and P		
Total General Indirect		
SUMMARY FOR JOURNAL:		
Total Direct Labor		
Total Indirect Labor		
Total Labor		

Form 2

PAY ROLL RECORD

*Name*_____ *Number*_____

*Date Commenced*_____ *Department*_____

Week Ended

JAN.		FEB.		MARCH		APRIL		MAY		JUNE		JULY	
	Amount		Amount		Amount		Amount		Amount		Amount		Amount
Weekly Totals													

AUG.		SEPT.		OCT.		NOV.		DEC.	
	Amount		Amount		Amount		Amount		Amount
Weekly Totals									

Total For Period _____

Form 3

With a cheerful disposition he can ofttimes annihilate that which might become a riot or a strike

during times of labor unrest, while we are trying to get readjusted and upon a more economic basis.

Perhaps he is a notary and a tax expert. He can give his services in a thousand different ways to every employe and win the confidence and respect of every one responsible for the red and black ink figures on the balance sheet. It takes but a few minutes to fill out that military bonus application, that automobile license or ownership certificate application and the result in good-will is worth thousands of dollars to the company. You may say that is not the company's business, doesn't make paper, but you err; it surely does make paper, for a mind free from outside worries leaves more cells vacant in the working man's loft for paper making ideas and increases his efficiency.

The Form (1) submitted is used both as a record of previous month's past history and a handy sheet upon which to record estimates. A form to be sure, such as this one will not of itself perform any miracles without the application of common sense, but the combination will surprise you.

Form No. 2 "Pay Roll Recap Sheet" is concise, complete and inexpensive and a valuable one from which the insurance inspector may make his analysis and apply the different rates applicable.

Form No. 3 (Individual Labor Record) is of value when each week's pay roll is posted to it. A complete record of each employe's compensation is always available and a necessity at the end of each year when recapping for Government form No. 1099 (Employes receiving $1,000 or over).

The writer will be pleased to mail samples should any of his readers desire. You have but to ask.

Graphic Boiler Plant Records

By E. R. LOW

TO SOME extent every modern pulp and paper mill makes use of the chart system for recording information regarding operating conditions, costs and other important items. In the majority, however, the value of such records is depreciated due to their covering a few of the large items and therefore the smaller details, which over a period of a year amount to considerable, are overlooked. There is no doubt that the chart system offers the best and simplest means of recording information so that quick comparisons of different periods can be made and to make a stronger impression upon those interested. It is not the intention to point out here the value of using charts for every department of a mill nor to outline how they should be kept, because it is felt that this subject has already been covered so fully that its value is appreciated. But there is one very important department in the mill to which insufficient attention is given to the small details and where the extensive use of charts would increase efficiency and lower costs. This department is the boiler plant.

Assume for a moment that we have two identical, separately owned and operated boiler plants located at equal distances from the paper mill, and that there is no other boiler house in connection with the mill. It is necessary therefore for the paper mill to purchase steam for drying, heating and power from one of these plants. Naturally the boiler plants are going to sell their products at a price which will give them a fair profit over their operating costs and interest on investment, and obviously the one which can sell steam the cheaper is going to get the business. Because the two plants are on an equal basis, it is easily seen that the one which can operate the more efficiently is the one which can afford to sell steam the cheaper. And to operate efficiently it is necessary for the management to watch every item which goes to make up the total cost and to study every detail in the operation of his plant. Now every paper mill manager or superintendent should consider his boiler room as a separate manufacturing plant and take as much interest in having it show a profit as he does in the mill itself. To be sure the profits from the boiler house will not show up directly but will be reflected in the profits from the sale of paper; and in fact may be the deciding factor in the success or failure of the mill. In order to increase the mill profits by means of the boiler house economies, it is essential for the mill executive to apply the same modern practices in this department as he does in the others.

During the past few years boiler house costs have become abnormally high and have been given insufficient attention due to the large demand for paper and the willingness of the buyer to pay any price within reason so long as his needs were met. The executive has had no time to spend in the study of small details because of the cry for greater production. The possible saving of a few thousand dollars in the coal bill was considered negligible when compared with the many thousands of dollars' worth of paper that could be sold if production could be increased. With the decreased demand for paper, and the continued high delivered price of fuel therefore, it is high time to pay particular attention to the efficiency of the boiler room in order to help reduce the price of paper to a point where a demand will again be created, and where the present day price-discriminating buyer will be attracted.

Through the medium of a simple system of charts, the various items which make up the boiler house

costs can be watched and will furnish a means to increased efficiency. The charts will create an interest from the chief executive down to the laborer who handles the coal and ashes. They will bring out the weak points and by comparison with the strong ones, stimulate the men to greater efforts. They will paint a picture which will be an inspiration whereby the almost forgotten friendly rivalry between the men on different tours will again become established.

First let us consider records which can be kept mechanically. The recording steam pressure gauge is of prime importance. A constant steam pressure at all times is absolutely necessary for the efficient operation of the mill and the recording steam gauge is an automatic means of securing this constant pressure. It furnishes a continuous record of the steam pressure, and any conscientious employe in the boiler room will take pride in eliminating peaks and valleys in the chart. Even if special effort is made to keep the steam pressure constant, the most careful operator cannot know definitely what results he is securing unless he has a recording gauge. With it he has a constant reminder to help keep him from becoming careless, indifferent or forgetful. In the same manner, recording thermometers for feed water and flue gases help to increase the boiler plant efficiency.

An automatic means of charting the quantity of feed water is another important item. Assume that a water meter without a chart attachment is in use. This tells the amount of water being fed to the boilers for any desired period and is a factor in checking the general efficiency, but it requires a chart to show whether the water is going to the boilers as it should—regularly. And a graphic story of the feed control is vitally essential.

One very desirable chart for the assistance in securing high efficiency is that showing the steam output from any one boiler, a battery of boilers or of any steam line. Combined with this, the rate of air supply to the furnace and the condition of the fuel bed can be shown on one chart. Each of these latter two has a very distinct and important bearing upon the capacity and efficiency of the boiler, and they are both under the immediate control of the fireman. The former chart is an indicator for assisting in equalizing the load on individual boilers of a battery, discovering the losses originating from leaks between boilers and points of consumption, discovering internal leaks in boilers shown by differences in water input and the steam output, and determining when boilers need cleaning, or if the method of stoking is satisfactory. The instruments which make these charts should be installed in every boiler plant as they will prove to be a highly paying investment.

The CO_2 recorded is an instrument which constantly and automatically analyzes the flue gases and thereby places in the hands of the boiler room operator the key to efficiency in the coal consumption. At the same time the draft can be plotted on the same chart. This instrument will be a check on all of the many factors which lead to inefficiency, such as the condition of the fuel on the grates and leaky settings. It will indicate each slight change in the furnace operation and is a means of determining exactly what must be done to secure the best results. By recording the CO_2 and draft graphically, the fireman can at a glance secure the necessary information for good operation and this information is impressed firmly upon his mind.

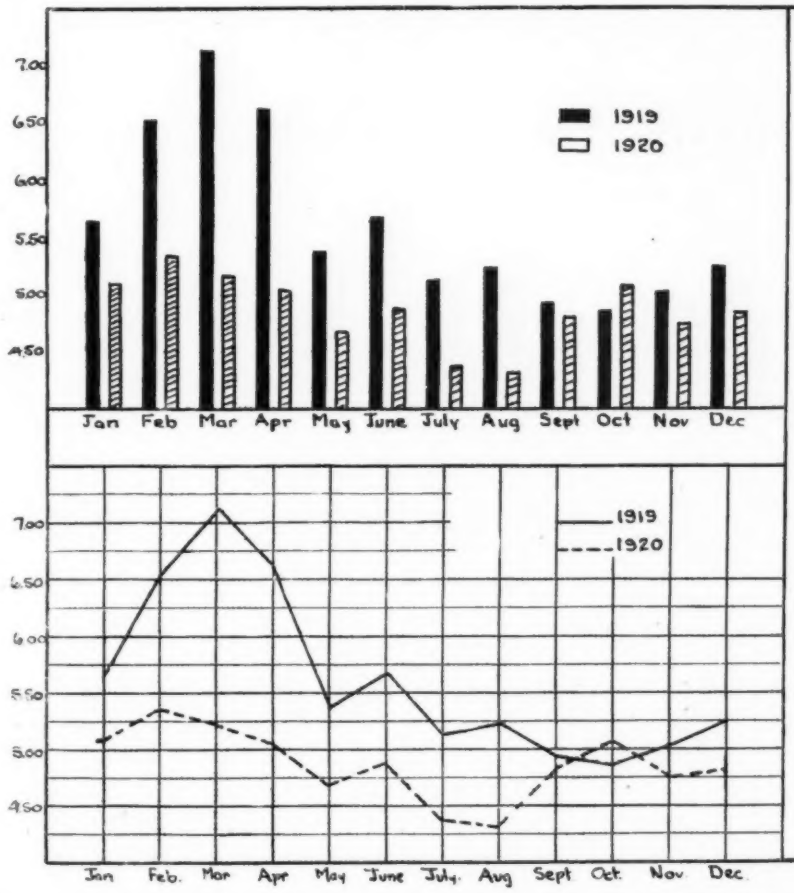
Location of Recording Instruments

Opinions differ as to the most desirable location for the recording instruments which may be placed at any point in the factory within reasonable distance of the boilers. Some believe the plant superintendent's office is the proper location; others in the manager's office. As many of the executives have many other matters to occupy their minds and, as the charts can be delivered to them once a day for survey and a check on the operating conditions in the boiler house, it is the writer's opinion that the instruments should be located in the boiler room itself. Here they come under the constant observation of the men directly responsible for the results obtained, and it is only here that the interest of the men may be stimulated by them.

While the records heretofore mentioned are important, there are others which have a large bearing on increasing the boiler plant efficiency. These must be charted, however, from information obtained from periodically computed or observed records. The value of these depends upon the thoroughness of keeping them, and as stated before, upon the recording of small as well as large items. The charts can be conveniently divided into three divisions. The first includes those items which are to be recorded daily and are of particular interest to the executive, such as the amount of coal burned, pounds of coal burned per ton of paper made, and the total amount of water evaporated. Secondly are those items which are of special interest to the technical man and are satisfactorily shown at weekly periods. These items include average CO_2, average boiler efficiency, heat value in coal, and other correlated items. The third set of charts would cover items plotted from information tabulated monthly. These are of interest to all, including the operator and are mostly cost items. They include cost of unloading coal, total labor cost, cost of maintaining boilers, furnaces, pumps and conveyors, cost of coal, etc. This is by no means a complete list and is mentioned merely to give a general idea of the different classes for the graphical records.

A few specific examples of what the chart system has done in some plants illustrate its value. In one a chart was kept showing the amount of coal burned per ton of paper made. Before the chart system was started this item was given serious consideration by the management, but the men directly responsible,

the firemen, were not interested in being shown a statement of figures which gave a comparison of different months. When these same figures were charted, however, the men immediately became impressed and began to take an interest in having the lines for each month shown at a lower point than the preceding month. In other words, the chart put before the men a picture which inspired them to better the previous records. By installing a bonus system at the same time the picture was given more color.



	1919	1920
Jan.	5.63	5.10
Feb.	6.54	5.35
Mar.	7.13	5.23
Apr.	6.61	5.05
May.	5.36	4.67
June.	5.67	4.89
July.	5.14	4.37
Aug.	4.24	4.32
Sept.	4.94	4.81
Oct.	4.86	5.08
Nov.	5.02	4.75
Dec.	5.25	4.84

In another mill the total cost of repairs was charted and while the system helped to reduce them, they still remained excessive. Other charts showing the details of the repair costs were then started and within a short time attention was called to the large number of boiler tubes which were being used. The investigation of the causes of this led to the installation of a water softening system which not only practically eliminated the replacing of tubes, but of much greater importance reduced the coal costs by eliminating scale in the tubes as well as reducing the labor on repairs by one-half.

Another example of the value of the chart system which affected the boiler house is interesting, yet the chart covered another department of the factory. This chart recorded the number of hours of shutdowns of the paper machines. Analysis showed steam shortage to be one of the primary causes. The boiler capacity was ample to keep the mill running to full capacity so long as all boilers were in operation. Of necessity, however, there were times when one boiler must be down for repairs or cleaning and at such times the remaining boilers were not capable of carrying the full load. The cost of installing a spare boiler was returned in a very short time by increased production due to the boiler plant being able to always supply sufficient steam required. This mill was one of a number owned by a corporation, and although the local management knew the necessity of the extra boiler, it was only by means of the chart that the company officials were convinced of the incorrectness of their contention that the boiler plant was of sufficient capacity.

The accompanying illustration shows three methods of presenting the cost per ton of coal per ton of paper and gives an excellent conception of the best manner of placing any information before those interested. In the tabulation, the average monthly cost for a period of two years is shown, but in order to make a comparison of any one month with the others, or to determine what improvement is being made, considerable study is necessary and even then it is difficult to formulate a clear and concise opinion.

On the other hand, a glance at either of the two charts immediately tells the story. The columned chart is the better to make a quick comparison between the same months of different years, while the straight line chart gives a better picture of the entire two-year period, and in the majority of cases will be found to be the more desirable. In the same way, all of the boiler house data can be quickly and easily recorded, and if the log is kept in the form of charts rather than in the usual manner, its value will be increased many fold. It will become a book of interest as well as of pleasure to record, and as stated before, will be of unquestionable value in assisting the management to secure increased efficiency.

Chemical Control for De-inking Paper

By C. M. JOYCE

DURING the past fifteen or twenty years, numerous methods for de-inking waste paper have been proposed. Many of these have been tried on a large scale involving great expenditure for equipment and materials. The net result of all this effort, however, may be expressed by saying that most mills are just where they started. The paper maker of today has little faith in new de-inking processes; he is not inclined to spend any time or money trying them. For this reason he is called narrow and unprogressive.

A careful study of the causes of these failures would justify the paper maker in his attitude. Many of those who have proposed de-inking methods have never seen a mill at all, do not have the working knowledge to take account of the interrelations of the market for raw materials and finished paper, cost of chemicals, and special mill conditions. There is no need for extra refinement in de-inking newsprint when the only use for the finished pulp is box board and cardboard filler. There is no use in recommending chemicals worth more than the pulp.

A valuable process for recovering newsprint, discovered by Baskerville and Stevenson,[1] has not received the attention it deserves because it has not provided for the mill difficulties in handling slack sized paper. Mill superintendents immediately raised the question whether newsprint can be used successfully in quantity on account of its rapid absorption of water and tendency to form bunches difficult to disintegrate. A mass of newsprint introduced rapidly into a de-inking bath accumulates near the top, forming an unwieldy wet mass which will often break a paddle before it disintegrates. Without waiting to see how this trouble may be overcome, mill men, with recollections of previous failures, do not care to consider the process. So the old soda boil, followed by washing of the resultant steaming, bad smelling, yellow mass, persists while chemists look on with disgust at the primitive mill methods which are being used.

After such a pessimistic beginning, the reader of this paper will not expect a solution of this important problem and the writer will not be sanguine enough even to attempt to propose one. However, a few general principles have been developed out of years of wide effort with small results, and these will be set forth in the hope that they will suggest improvements which some mill men may find adapted to their conditions.

Apparatus and Treatment

In preparing book stock and newsprint, it is highly desirable to loosen the ink before subjecting the stock to any pulping process which imbeds the ink in the fiber in such a way that its removal is impossible. It is also desirable to use the mildest possible chemical treatment, best accomplished by adjusting the amount of soda ash to a minimum quantity. A temperature somewhat less than boiling is an undoubted advantage as it makes it possible to turn out a pulp less tendered and less yellow.

Had the outside chemist not already discredited himself by proposing chemicals whose price is out of reason, and apparatus too expensive or unwieldy to handle, he might make a real improvement in the average mill by painstaking adjustment of the factors mentioned.

For the de-inking bath, a boiler can be fitted up for external circulation by connecting it at the bottom to the intake of a rotary pump which discharges tangentially near the top of the boiler. By means of a Y-valve connection, the contents of the boiler can be pumped to the washer when finished. The paper may also be treated with de-inking chemicals in an ordinary beater used with the roll lifted clear of the bed plate (so that the ink will not be ground into the fiber), with a steam supply to raise the temperature of the contents nearly to boiling. If the beater has been used only for cold water previously, the wooden filler between the roll knives should be treated to withstand hot water. For removing the

[1] J. Ind. Eng. Chem., Vol. 13, No. 3, p. 213 (1921).

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loosened ink a Lancaster washer has been used successfully by many mills.

Chemical Control Required

The form of apparatus used is less important than the careful chemical control of the process. To obtain the desired quality of product, maximum production and minimum cost of chemicals the following factors must be considered: (1) Ratio of water to weight of paper treated, (2) amount and kind of chemicals used, (3) rate of circulation of alkaline bath, (4) temperature, and (5) time. Increasing proportions of water make the pulp flow more freely so that the ink is more readily loosened by the chemical treatment. The amount is of course limited inasmuch as too large a proportion of water curtails the production. The more freely the pulp flows and the greater the agitation, the smaller the amount of chemicals required, because they will more readily come in contact with the pulp. It is important to have perfect circulation in order to avoid the possibility of a bunch of paper lodging somewhere until the chemical treatment is ended and then becoming free and distributing ink specks throughout the whole mass. Not infrequently excess chemicals are added to overcome defects in reality caused by poor circulation, a practice which adds to the expense and tenders and yellows the fiber. The adjustment of the temperature is also important as too little heat impairs the chemical action and too much heat degrades the fiber. The time of treatment should be determined by taking samples every 15 minutes and washing them on a screen and continuing the treatment until no more ink specks appear.

The success of the chemical control depends on the intelligent co-operation of the chemist with the mill superintendent, a condition which now seems to exist only in the largest mills.

Accident Records

How to Compile Them and How to Use Them

Prepared by the Engineering Department of the National Safety Council

THE principal purpose of accident records or statistics is to prevent accidents, by

(a) showing the operating executives and the safety department where accidents are occurring and from what causes, so they may know where to concentrate their efforts for prevention, and

(b) attracting the attention of workmen, and stimulating rivalry between divisions, shops or departments, so that the superintendents, foremen, and workmen will strive to produce a record which will compare favorably with other departments and with their own past record.

Any collection of figures, no matter how interesting, which cannot be used for one or both of these purposes, is practically valueless for accident prevention and has no place in an efficient organization.

Collecting Accident Data

Accident records, to be of practical value, must include the complete story from the time the accident occurs until the injured person is back at work or the case otherwise adjusted and closed. This requires co-operation between the safety department, medical department or hospital, operating department, employment department, and often the legal or the accounting department. Several members of the Council have found it possible to work out a system which, with a minimum expenditure of time in filling out report blanks, insures that each of these departments will know what the others are doing, and presents a history of the case from which monthly and yearly records may be easily compiled.

While details must be varied to meet local conditions, the general outline of the system used in different industries is fairly uniform. The method and the forms suggested below can be adapted or expanded to meet the needs of almost any employer.

Prompt Report Necessary

When an employe is injured, he should report at once to a first-aid station, plant dispensary, or hospital, or to some authorized person who will direct him to a physician. Failure to secure prompt treatment may lead to serious infection.

Daily Record of All Accidents

The medical department, hospital, or first-aid attendant should keep a daily record of all injury cases which are reported, whether serious or minor. Even apparently trivial injuries may later become serious and result in controversy, and in such cases a record made at the time of injury will prove valuable. This daily record should show the name and check number of the injured, cause and nature of injury, where accident occurred, the treatment given, and disposition of the case. Records of all dressings are usually kept in a book, using one line for each case.

Hospital Record Card

In addition to the daily record book the medical department should, at the time the injured employe reports for first treatment, start a "case" record card, such as Form 1, and should make suitable entries thereon from time to time until final recovery.

Some members use such cards for lost time cases only; others use them for all injuries which require medical attention. Unless the safety department has convenient access to these records, the medical department should send a report to the safety department, giving the necessary information.

Notice of Injury

In the case of all injuries which cause a loss of time, the medical department should at once notify

HOSPITAL RECORD OF INJURED EMPLOYEE

Name ..... Check No. ..... Case No. .....
Address ..... Nationality ..... Speak English .....
Age ..... Sex ..... Married or single ..... Children .....
Date Employed ..... 19... Occupation ..... Department .....
Date Injured ..... 19... Time of day ..... a. m. ..... p. m.
Date Reported ..... 19... Time of day ..... a. m. ..... p. m.
STATEMENT OF EMPLOYEE
Where did accident occur? .....
Machinery, tool, or appliance? .....
How did accident happen? .....
Diagnosis .....
Prognosis ..... Estimated disability .....
Date ..... 19... .....
Medical Officer

(Reverse Side)

Name ..... Check No. ..... Case No. .....

TREATMENT RECORD

Code: V—House visit; O—Office; H—Hospital; N—Night visit; S—Operation; X—X-ray

Month | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31

Pronounced able to resume work on ..... 19...

Operation .....

Date	Treatment given	Date	Treatment given

Condition when discharged from treatment .....
Date ..... 19... .....
Medical Officer

FORM 1—FRONT AND REVERSE SIDES OF 5x8 HOSPITAL RECORD CARD
Most plant hospitals also keep a "Daily Record" of all treatments and dressings given

the safety department, the shop foreman, and the employment department. The safety department should be notified so that an investigation may at once be made of the circumstances surrounding the accident. The shop department should be notified so that the foreman also may investigate, make a report of the accident, and correct any hazardous practice or condition. The employment department should be notified so that the cause of absence may be correctly noted. Form 2, Notification of Absence, is typical of the forms used for this purpose and may be used for cases of sickness as well as accident.

In plants having no medical department or first-aid room, a report similar to Form 2 should be made out by the person who sends the injured man to the doctor.

Report of Accident

As soon as the foreman is notified of an accident, he should make an immediate investigation, make a report (Form 3) and send it to the safety department. In plants having a well organized safety department, a separate investigation is made by an inspector of that department. The results of such investigation may be separately reported on Form 3 or some similar form, including a more complete narration of the accident, description of machinery, etc., and in many cases a sketch or photograph made as soon as possible after the accident.

Report to State

Practically all states now have compensation laws and require a report, on a standard form, for all accidents causing more than a specified loss of time. To insure that such reports will be accurate and complete, they should be filled out by the safety department. Some companies find it advantageous to use the state report form for all lost time accidents, in place of Form 3.

That the report may show correctly the wage of the injured person, it is necessary that the accounting department furnish this information. A simple form may be prepared for this purpose, with space for the names of several men on a single sheet. Since the methods used by various states differ in regard to the calculation of compensation it is necesdepartment as to the proper method of computing sary that each company instruct the accounting wages for this purpose.

Record of Employment

It is to be assumed that the employment department has a permanent record of each employe, showing employe's sex, age, race or nativity, whether married or single, number of children and other dependents, the date employed, whether at the time of employment he had any physical defect or deformity, such as defective sight or hearing, and possibly other such information. It is advisable that the information given by employe at time of accident be checked with his employment record card.

Return to Work Notice

When an injured workman has recovered sufficiently to return to work, the medical department

NOTIFICATION OF ABSENCE

To .....
..... Department
Name ..... Check No. .....
Occupation ..... Address .....
Is absent on account of ..... (nature of injury or sickness)
and should not be allowed to work until further notice from this department.
Injury occurred ..... 19... Reported ..... 19...
Disability began ..... 19... and will probably continue for .....
Date ..... 19... .....
(Medical Department)

DEPARTMENT FOREMAN MUST AT ONCE FILL OUT ACCIDENT REPORT (Form 3) AND SEND TO SAFETY DEPARTMENT.

FORM 2—NOTIFICATION OF ABSENCE
This form is to be filled out by the medical department for all lost time cases, either accident or sickness. Copies should be sent to the safety department, foreman, and employment department.

should notify the safety department, with copies to the foreman and the employment department if desired. Form 4 is well adapted for such notification. If a practicing physician attends the injured person,

or if the plant does not have a dispensary or hospital, it may be more satisfactory for the doctor to notify the safety department (preferably in writing) when injured men are able to resume work, after which the safety department will issue Form 4 to the department concerned.

Tabulation of Accident Data

With a satisfactory system for recording the facts in connection with each accident, the next step is to compile the data so as to be useful. A uniform method of tabulation should be followed so that one plant may be compared with another and one industry with another. The National Safety Council's Committee on Uniform Industrial Accident Statistics recommends the use of the standard method approved by the International Association of Industrial Accident Boards and Commissions, the essentials of which are stated below.

Standard Definitions and Tables

Tabulatable Accidents, Diseases and Injuries—All accidents, diseases and injuries arising out of the employment and resulting in death, permanent disability, or in the loss of time other than the remainder of the day, shift, or turn on which the injury incurred should be classified as "tabulatable accidents, diseases and injuries."

Compensable Accidents, Diseases and Injuries—These, as used in any report in accordance with the practice in any particular state, should be shown separately and clearly defined.

FOREMAN'S REPORT OF ACCIDENT

Name ..... Check No. .....

Occupation ..... How long in your department .....

Date injured ..... 19... Time of day ..... p. m.

Place where accident occurred .....

Injured person's immediate superior .....

Where was he at time of accident? .....

Had employee been instructed in the work? ..... By whom? .....

Machinery, tool, or appliance involved .....

Is it in good condition? ..... Is a safeguard provided? .....

Describe in full how accident happened .....

Witnesses to accident: .....

What can be done to prevent a similar accident? .....

Date ..... 19... Foreman .....

FORM 3—FOREMAN'S REPORT OF ACCIDENT
This should be filled out at once and sent to the safety department, the foreman retaining a copy.

Permanent Total Disability—To this group should be assigned every accident, disease, or injury which is designated by statute as permanent total disability, or which permanently incapacitates the workman from performing any work continuously in any gainful occupation.

Permanent Partial Disability—To this group should be assigned every accident, disease or injury (less than permanent total disability) which results in the loss of any member of the body or part thereof, or in the permanent impairment of any function of the body.

ABLE TO RESUME WORK NOTICE

To .... Dept.

Name ..... Check No. .....

Absent since ..... 19..... on account of injury / sickness

is able to resume work on ..... 19.....

at his usual duties (or)

at .....

Date ..... 19...

.....
Medical Department.

FORM 4—NOTICE THAT EMPLOYEE IS ABLE TO RESUME WORK
To be sent to safety department with copies to foreman and employment department if desired.

Accident Frequency Rates

The practical value of accident statistics is greatly increased by the use of frequency rates (see Table 1).

TABLE 1. FREQUENCY OF ACCIDENTS BY DEPARTMENTS AND EXTENT OF DISABILITY

Depts.	Number of full-time workers	Pay roll exposure	Number of tabulatable accidents: Total	Deaths	Permanent total disabilities	Permanent partial disabilities	Temporary disabilities: Over 2 weeks	Over 1 to 2 weeks	One week and under	Rates: Accidents per 1000 full-time workers	Accidents per $100,000 of audited pay roll
1	2	3	4	5	6	7	8	9	10	11	12

TABLE 2. SEVERITY OF INJURIES BY DEPARTMENTS AND EXTENT OF DISABILITY

Depts.	Number of full-time workers	Pay roll exposure	Days lost due to: Total days lost	Deaths	Permanent total disabilities	Permanent partial disabilities	Temporary disabilities: Over 2 weeks	Over 1 to 2 weeks	One week and under	Days lost per full-time worker	Days lost per $100,000 of audited pay roll
1	2	3	4	5	6	7	8	9	10	11	12

TABLE 3. CAUSES OF ACCIDENTS, BY EXTENT OF DISABILITY

CAUSES	Number of tabulatable accidents: Total	Deaths	Permanent total disabilities	Permanent partial disabilities	Temporary disabilities: Over 2 weeks	Over 1 to 2 weeks	One week and under	Days lost due to: Total	Deaths	Permanent total disabilities	Permanent partial disabilities	Over 2 weeks	Over 1 to 2 weeks	One week and under
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Machinery														
Prime movers														
Power transmission apparatus. (For list of causes see paragraph 29)														

The basis of all rates is necessarily the number of men exposed to the risk of accident. Since the working time varies, it is necessary to reduce the time factor to a standard basis. The Association of Accident Boards recommends that accident frequency rates be expressed in terms of the number of

lost time accidents per 1,000,000 hours actually worked by the employes.

Temporary Disabilities

In the standard tables suggested, the classification "Temporary Disabilities" is divided into three classes; over two weeks, one week to two weeks, and one week and under. These divisions are made because in some states accidents are compensable after the first week, while in others they are compensable only after the second week. For comparing plants and industries located in different states these subdivisions are desirable.

Accident Severity Rates

To supplement the accident frequency rate it is desirable to determine also the rate of accident severity (see Table 2). By indicating the severity of all injuries on the basis of time lost, which is more definite and stable than the wage loss, we obtain an accurate measure of the hazards of any plant, department, or operation, and of the results accomplished by accident prevention work. Accident severity should be computed in terms of days lost per 1,000 hours worked. In computing days lost by temporary disabilities, the actual duration of disability in working days should be used. The day of the accident should be counted as the first day.

To make the severity record complete, some account must be taken of fatal accidents and permanent disabilities. A scale of arbitrary equivalents for such injuries, in terms of days lost, is advocated by the International Association of Industrial Accident Boards and Commissions and by the U. S. Bureau of Labor Statistics and will be found in Bulletin 201 of that Bureau. Some members of the Council keep a separate record of fatal and permanent injuries.

Classification by Causes

The classification of accidents by causes is of the utmost importance, because it directs attention to those conditions in the plant which require correction. (See Table 3). Nearly every accident results from a combination of causes. Authorities agree, however, that accidents should be ascribed to the proximate or immediate cause—"to that condition or circumstance, the absence of which would have prevented the accident; but if there be more than one such condition or circumstance, then to the one most easily prevented."

For example, a workman passing through an aisle, which is insufficiently lighted, stumbles upon a defective floor and throws his hand into an open gear which crushes off two of his fingers. Under this ruling, the accident is charged to the gear and not to stumbling or insufficient lighting, for had the gear been properly guarded, the workman would not have suffered the injury which he did—the loss of two fingers—though he might have been otherwise injured by his fall.

It is impossible to suggest a classification of causes which will be suitable for use in every plant and industry. A list sufficiently detailed to cover every accident cause in every plant and industry would be much too long for practical use in any one case. The list given below is simply a skeleton outline and must be amplified by inserting the subdivisions which are most important in the particular plant or industry. For example, under "Power working machinery" a metal-working shop will insert such items as planers, shaper, millers, slotters, lathes, drill presses, etc.; while a woodworking shop would include circular saws, boring machines, jointers, shapers, tenoners, etc. The last division, "Miscellaneous Causes," includes flying particles (other than those set in motion by working machines or tools); doors, windows and gates (exclusive of elevators); asphyxiation, heat prostration, drowning, and other causes not chargeable under any of the other divisions. For full list of causes see Bulletin 201 of the U. S. Bureau of Labor Statistics; this list has recently been slightly revised, and up-to-date information may be obtained from the Bureau of Labor Statistics, Washington, D. C.

Classification of Accident Causes

Machinery
- Prime movers.
- Power-transmission apparatus.
- Power working machinery.
- (Insert principal machines used.)
- Machines other than working machines.
- Hoisting apparatus:
  - Elevators.
  - Cranes.
  - Derricks and jib cranes, etc.
- Conveyors.

Vehicles
- Cars and engines—steam and electric railways.
- Mine and quarry cars and motors.
- Plant trucks on tracks.
- Automobile and other power vehicles.
- Animal-drawn vehicles (not mine or quarry cars).
- Water craft.
- All other vehicles.

Explosives, electricity, fires and hot and corrosive substances
- Boilers and steam pressure apparatus.
- Explosions of explosive substances.
- Other explosions.
- Electricity.
- Conflagrations.
- Hot substances and flames.

Poisonous and corrosive substances and occupational diseases

Falls of persons
- From elevators.

Into excavations, pits and shafts.
On level.

Stepping or striking against objects

Falling objects—not being handled by injured
Collapse of buildings, piles, scaffolds, etc.
From elevations.
Trees.
Objects tipping over (except vehicles).
Into excavations.
In mines and quarries, etc.

Handling of objects
Heavy objects (loading, unloading, carrying, lifting, rolling or piling).
Sharp or rough objects.
Hand trucks, carts and wheelbarrows.

Hand tools (including flying nails, chips or particles set in motion by tool)
Animals.
Miscellaneous causes.

The Use of Accident Statistics

Accurate accident experience data is of great value in the prevention of accidents. For executives, simple and effective charts and tables may be prepared which will show at a glance the progress in safety work by departments, and where to concentrate efforts for accident prevention. For stimulating interest on the part of foremen and workmen, bulletins and charts may be prepared showing the accident record of each department compared to that of other departments and to their own record of the past month or year.

For the Executives

The plant executive will usually be interested in any of the charts which are prepared for bulletin board use. In addition, a data sheet may well be prepared each month which will give exact and more detailed information, and which may be filed in a permanent reference folder. The report used by the Emergency Fleet Corporation is shown below.

Graphic charts are also used by many companies to visualize the progress of Safety Work. The graphic method should not be overdone. A few simple lines indicating the trend of accident frequency are more effective than confusing lines.

For the Bulletin Board

Charts for the bulletin board should be easily intelligible. It is best to cover only one idea on a chart, i.e., one chart to show number of lost time accidents, another to show days lost, and another to show causes of accidents. To maintain continuous interest, the frequency and severity rates should be calculated and displayed at the end of each month.

Vary the form of the chart from time to time; the records should always be computed on the same basis, but should be presented in different ways. If a plant sticks to the same set of tables, the same old charts, from year to year, interest will die out. Each year a new method of presentation should be adopted.

Power Plant Management

Keeping Books with the Power Plant—Part I

By ROBERT JUNE, M. E.

ITEMIZED records of plant equipment, plant performance, and costs of operation, are of vital importance in the operation of all power plants if the most economical results are to be obtained. It should go without saying, but unfortunately does not, in many cases, that records are of no value as records. If they are simply filed away without ever being consulted, they are worse than useless.

Records Are of Value for Two Purposes

(a) To give the management comparative data on the performance of a power plant from time to time so that it will be possible to tell just what power is costing.

(b) To place information in the hands of the chief engineer and his principal assistants, which will enable them to cut production and maintenance costs and to choose additional equipment, when required, wisely.

The records to be kept may be divided into the following general characteristics:

1—Permanent specifications of all equipment.
2—Record of load demands.
3—Costs of operation.

Taking up the first of these, it is probably safe to say that with only a very small percentage of power plants are proper permanent specifications of equipment kept on file. Yet the value of these will hardly be gainsaid by any operating man who has ever had to make repairs quickly, or who has ever been called upon for advice in connection with power plant extensions. Probably the best system to employ is that maintaining tabulated specifications on a series of large cards kept in permanent index, but it is just as practical to record the data in a good sized book if that seems the more desirable. As typical of the statistics that should be maintained, the following are examples of boilers, feed-pumps, and soot blowers:

Specification Data—Boilers

Make of boiler.....Stirling
Number in plant.....6
Shop numbers.....

	2—October, 1909
	2— March, 1913
Date of Installation	
	1—January, 1917
	1—January, 1917
Weight of boilers	63,500 lbs.
Cost of boiler and fittings	
	2—$11,200.00
	2— 12,300.00
	2— 16,400.00
Cost of Foundation and setting	
	2—$ 3,200.00
	2— 3,650.00
	2— 4,325.00
Rated horsepower	412
Steam pressure gauge	200
Safety valve pressure	210
Type of safety valve	(2) Pop
Heating surface, sq. ft	3,800
Superheating surface, sq. ft	300
Number of steam drums	3—36″
Diameter of safety valve	4″
Diameter of steam nozzle	10″
Diameter of feed pipe	2″
Diameter of blow-off	2½″
Type of stoker	B. & W. Chain Grate
Temperature of feed water	200° F.
Number of tubes	363
Diameter of tubes	3¼″
Length of tubes	13 to 15 ft.
Steam space	112 cu. ft.
Water space	700 cu. ft.
Draft	Mechanical
Maximum draft	3″
Height of setting	18′2″
Length of setting	17′8″
Width of setting	16′4″
Thickness of walls	
	side 20″
	back 15″
Number of fire brick	6,860
Number of common brick	22,400
Distance between batteries	4′6″
Distance from back of boiler to wall	15′
Distance from front of boiler to wall	14′2″

Specification Data—Feed Pumps

Make of pump	Goulds
Number in plant	3
Overall dimensions	3x4x12 ft.
Cost of installation	1—$1,125.00
Cost of installation	1— 1,250.00
Cost of installation	1— 1,400.00
Displacement per stroke	56/100
Strokes per minute	12
Steam pressure	200 lbs.
Back pressure	½ lb.
Diameter steam cylinder	16″
Diameter water cylinder	10″
Stroke	12″
Diameter of suction	8″
Diameter of discharge	5″
Diameter of steam pipe	2″
Diameter of exhaust	4″
Diameter of steam drips	½″
Diameter of water drains	½″
Discharge head, lb. per sq. in	175
Temperature of feed water	200
Pounds of water per minute	
Pounds of water per 24 hrs	
Type of piston packing	
Kind of rod packing	Soft
Size of rod	⅝″

Specification Data—Soot Blowers

Make of blower	Diamond
Cost of installation per boiler	$720.00
Date installed	June, 1917
Type Model "G"	Revolving
Number of calorized units	3
Number of plain units	3
Type of header	Vertical
Diameter of header	2″
Diameter of risers	1½″
Make of valves	Hancock
Diameter of drains	½″
Location of units (see blueprints)	
	2 405
Diameter of nozzles	5/16″
Type of nozzle	Venturi

The above record, while apparently very complete, could probably be supplemented with additional data. It has seemed desirable to give them in detail in order to illustrate the importance of maintaining such specifications, as it must be evident from an examination of them, that if such records are maintained on file, a great deal of valuable time can be saved when it is necessary to look up points in connection with any of the equipment. Among other records of this sort to be kept, are the number and type of the various motors installed about the plant; the number and size of lights; the dimensions of buildings to be heated; the amount of radiation installed for heating purposes; the number and diameter of live steam mains leading to points where steam is used in manufacturing processes, etc.

Operational Records

In previous articles, we have discussed the use and the value of various measuring and recording instruments in the power plant. The records which these instruments give bear the same relation to the power plant as the accounting system does to the manufacturing operations in the main plant. It is only by tabulating and studying them that improvements in economy can be effected.

Unfortunately, it is not as easy to lay out a system of records for a power plant, with the same facility with which an accounting system can be laid out for

business. Everything depends upon the size of the plant and the conditions under which it operates.

With large central stations, permanent recording instruments can be installed, showing the steam flow, flue gas temperature, CO^2, pounds of coal per minute, pounds of feed water per minute, etc. With such records, it is extremely easy to detect errors in operational methods and correct them.

With a small plant, however, the cost of these devices may be prohibitive. Generally speaking, however, the small power plants of the country are inadequately supplied with measuring and recording devices, and every effort should be made to rectify this condition. Improvements in operating conditions are only possible with fairly accurate knowledge of the actual conditions obtaining in the plant.

Therefore, if you are the owner or manager of a medium-sized or small power plant, see that your operating men are supplied with at least some of the fundamental instruments. Even if they only take CO^2 and flue temperature records at intervals, they will do better work and cut the costs of production, because the instrument will tell them where "they are at."

It is very stimulating to have performance records before them but these are of no use if they are filed away without being studied. The oftener readings are taken, the better. Monthly and yearly averages are not enough. Daily, and even hourly, records are absolutely essential for maximum economy. Only by an intelligent analysis of daily records may the various losses be reduced to a minimum.

Load and Demand Factors

The average daily, monthly, and yearly load and demand factors of every power plant should be plotted and posted where they may be conveniently studied by the operating force. The load factor is, of course, the ratio of the actual output for the period covered, to the rated capacity. In order to avoid any confusion from the term "rated capacity," it should be taken as the maximum load which the prime mover can sustain continuously for 24 hours every day without overheating. To secure the greatest return on the investment in the power equipment, the thing desired in any power plant is a high load factor, not only daily, but weekly, monthly and yearly. If this is secured, all the factors which go to make up the cost of power should be operating at maximum capacity. Low average loads and high peak loads, and sensational fluctuation in power requirements, necessitate large pieces of equipment which are but little used and therefore increase the fixed charges.

Where conditions of fluctuating load exist in a manufacturing plant, it will often prove economical to operate only as many boilers and prime movers as may take care of the normal steady load, and to buy additional power required from the central station. This condition should be carefully studied by every operator of isolated plants.

The demand factor is the ratio of the maximum demand of all the various types of equipment to the connected load. One of the commonest mistakes made in industrial plant practice, is to overestimate the maximum demands resulting from the probable use of a large part of the equipment at the same time.

Thus, if a plant has a 1,000 H.P. of motors installed, the management might assume that a prime mover capable of supplying current to operate 800 to 900, or even 1,000 H.P., would be required; whereas a 60 per cent load factor would only require a prime mover capable of developing 600 H.P., as the general average in industrial plants. Of course, conditions vary in different plants, but before installing a large number of boilers and prime movers to supply theoretical demands, actual demand factors for the plant should be determined as accurately as possible. This is an extremely important point as it is very uneconomical to assume that because a certain H.P. of motors is installed, that an equal number of prime movers is required.

Cost of Power

In two power plants, built to exactly the same specifications, that is, with the same number and make of boilers, prime movers, etc., the costs of power may, and do, vary considerably. Every plant requires individual study. Among the factors to be taken into consideration are size of plant, load factor, load variations, ratio of maximum load to economic full load, number of hours a day the plant operates, cost of fuel, oil, waste, repairs, insurance, taxes, maintenance, depreciation, management and overhead.

In determining the costs in any plant, the first items to be arrived at are the fixed charges, that is, those items of expense which do not expand and contract with the output. Insurance, taxes, interest, and to a large extent, depreciation and management, go on whether the plan is in operation 1 per cent or 100 per cent of the time. To a large extent, labor is a fixed charge, since practically the same number of men are required if the plant is operating at 50 per cent capacity as at 100 per cent.

In studying the question of fixed charges with respect to the power plant, we are invariably driven back to a consideration of the load factor. This is true, because the higher the load, the greater the operating charges which cover such items as fuel, oil, etc., will be.

With a low load factor, fixed charges may easily be the dominating item of expense, and any additional investment in the plant should be avoided. With a high load factor, economy of operation is of paramount importance, and the equipment which will secure the greatest operating efficiency may prove an extremely profitable investment.

Depreciation

Depreciation is an extremely difficult matter to handle correctly in any plant. We may as well admit

frankly that it is almost impossible to estimate, with any degree of accuracy, the life of any piece of equipment.

Among the factors which enter into the question of depreciation, one of the most important is obsolescence. With the remarkable mechanical developments of the present age, and the rapid growth of our industrial plants, we never know when this factor is likely to appear.

When it does come up, it is apt to call for the scrapping of numerous pieces of equipment which are in splendid running order but which it is no longer profitable to operate because more economical machines are available.

Inadequacy is another factor resulting frequently from expansion of plants, community growth, etc. In addition to the two factors just mentioned, the possibility of destruction, due to fires, flood, etc., are to be considered.

The natural wear and tear on equipment may be estimated within reasonable limits. It is safe to assume, for instance, that a brick or concrete building will last 40 years; a water tube boiler, 25 years; a highspeed engine, 20 years; a generator, 20 years; condensers, heaters, pumps, etc., 20 years; motors, 15 years; conveyors, 15 years. Then, if desired, a proportionate amount of depreciation can be charged off each year. This is the method generally used.

It can hardly be termed satisfactory or accurate. In making this statement, we must admit the difficulty of substituting a better method. Personal observation, however, may indicate to the individual plant manager points where he can make more accurate allowance for depreciation without a flat charge of a certain percentage each year.

For instance, the moment a piece of equipment is put into service, it becomes a used article, and as such probably commands not to exceed 60 per cent of the value of a new article. After this initial 40 per cent depreciation, there is a period of several years when the value of the equipment will decline slowly. After that there is apt to be another rapid fall, as new and improved equipment comes on the market, so that at the end of five years it is worth only 20 or 30 per cent of its original cost.

This 20 or 30 per cent valuation, however, is quite likely to be maintained for a considerable period of time, even if new and highly improved equipment may be obtained on the market. At the end, say, of six years from the date of the original installment of the equipment, it is quite possible that if the depreciation on the equipment shall have been so charged off the books of the company that it represents only 20 or 30 per cent of the original valuation, it will be more economical to operate the old equipment than to install new; whereas, if the old equipment was held at 70 per cent of its original valuation, it might be more economical to scrap the old equipment and replace it with the new and improved type.

The method to be used in charging off depreciation is a matter for individual study, and is largel dependent upon the earning power of the power plant. The point cannot be emphasized too strongly, however, that in the present age, the chances are all in favor of obsolescence overtaking a piece of equipment long before the expiration of its natural life.

How Filter Paper Is Made

AN account is given in The Journal of the Society of Chemical Industry, by J. Barcham Green, of the process by which English filter-papers are made. The article states that the foundation of a good paper is suitable rag; old muslin curtains have been found to give the best results for fast filtration, but where strength is required a strong rag, like best canvas or old linen shirts, is often added.

After the rags have been sorted and cut by hand the dust is shaken out in a rotary machine made of wire gauze, then buttons and other foreign matter picked out, and the rag is boiled with alkali for one to four hours. Opinions differ as to whether alkali should be used, but 2 to 3 pounds per hundredweight of dry rag should not be harmful if the boiling is done without high pressure. The boiled rag is reduced to pulp in water in a beater provided with bronze knives fitted on to a solid drum, which can be lowered until the knives touch a grooved bronze plate. Paper that filters quickly is obtained by reducing the proportion of rag to water and increasing the speed of the beating, but much depends on the skill with which the roll or cylinder is adjusted to the grooved plate; when the beating has been done very quickly the finished sheet will sometimes show the threads of the muslin rag used.

The pulp is usually bleached with chloride of lime, the excess of which must be completely washed out with pure water. After beating, the pulp is strained to remove knots and lumps, run over magnetic separators to remove any particles of iron that may be present, mixed with water, and then run into a vat, either of stone or of iron lined with lead. A layer of pulp is obtained by dipping a mould covered with wire gauze into the vat, removing it and allowing the water to run off; the layer is pressed on to a felt and a pile of alternate layers of pulp and felt is put under a hydraulic press. The pressure applied largely determines the texture of the paper; if it be too great, a hard paper that filters slowly will be produced. The paper is dried either on a steam-heated cylinder or by hot air, sorted, and stocked as sheets or circles. Circles are cut from a wad of about 100 sheets by means of a steel cutter.

In the manufacture of filter paper particular attention has to be paid to its purity, strength, filtering speed, and ash content. To obtain a pure paper neutral spring water, free from organic matter and

containing little calcium bicarbonate, must be used. When testing for strength the paper must be wet; the strength when dry is often very different from the strength when wet, especially in the case of very strong papers intended for use with a filter pump. Roughly speaking, the stronger a paper the more slowly it filters, and to obviate this difficulty the manufacturer selects a very strong fibre, such as new linen, and beats it very rapidly to a pulp; otherwise it becomes slimy (if beaten long enough it would be converted into hydrocellulose and produce a sheet of parchment which would be waterproof). Strength can also be obtained by using thicker paper, but as this filters slowly some makers produce a paper with a crinkled surface. Such a surface cannot be given to hand-made papers, but a better result is obtained by folding the paper fanwise to produce a fluted surface.

The speed of filtration is ascertained by finding the time required for pure water to pass through the paper at a definite temperature. Liquids containing suspended solids, such as barium sulphate, are less suitable, as mistakes may be made in preparing them; they must, however, be used in testing the clarity of the filtrate.

Sulphite Pulp

By P. A. PAULSEN
Sulphite Department, Kimberly-Clark Co.

A lecture delivered by the author before the class in Papermaking, at Neenah, Wisconsin, January, 1921. Material furnished by the State Board of Education under the provision of the Wisconsin Educational Bonus Law, copyright privileges reserved by the University Extension Division and the State Board of Education, jointly

THE basic material of which pulp and paper are made is cellulose. The word cellulose conveys to the average person very little meaning or significance, and yet cellulose, in one form or another, is just as essential to humanity as is iron, copper, glass, or any other article well known to everybody. Cellulose may be defined as the material of which the cell walls of plants are composed. It is easy, therefore, to appreciate the abundance of this substance in nature and its wide distribution over the face of the earth. Cellulose is a carbohydrate, familiar to everyone in the form of cotton, linen, wood pulp, or paper. Its empirical formula is $C_6H_{10}O_5$. Clean cotton is almost pure cellulose. Most cellulose found in nature, however, is a compound of ligno-cellulose in which the cellulose is more or less strongly combined with lignin.

The sulphite process of manufacturing cellulose dates back to 1866. At that time the necessity of meeting the ever increasing demand for paper making material led to the investigation of wood as the most massive source of cellulose. As a result of the pioneer work of an Anglo-Swedish group, led by Dr. C. D. Ekman, the sulphite process of making cellulose was launched. In this process of resolving the raw material or ligno-cellulose into paper makers' pulp, the cellulose resists the severe treatment required to attach the non-cellulose or lignin compounds. The treatment consists of boiling the wood with acid compounds in closed vessels under pressures of 40 to 80 pounds per square inch and at the high temperatures of 140 to 160 degrees Centigrade.

From Forest to Woodroom

The procedure is as follows: The wood is cut in the forests, usually during the winter time, and is conveyed on sleds to the rivers or railroad stations. If possible, it is floated to the mills, otherwise it is loaded onto railroad cars and shipped to the mills where it is unloaded onto what is known as a log-deck or into a pond. The pond is to be preferred because of the low cost of maintenance, and also because in the winter time the water can be heated, thereby removing the frost from the wood before the wood is put through the process. The pond, however, requires much more space, and for this reason it is not always possible to make use of it.

The wood is then conveyed by chair conveyors to the cutting up machinery which consists of either a slasher or a cut-off saw. The slasher is usually used for the smaller sized logs such as spruce and balsam. The cut-off saw is used for the larger wood such as hemlock. The slasher consists of a series of saws mounted on a steel shaft running in cast-iron bearings which, in turn, are held on a solid steel framework. The saws are placed at such a distance apart as to cut the logs into the required lengths, usually two feet. The wood is conveyed to the saws by means of steel conveyors traveling at a speed of from twenty-five to thirty feet a minute. The cut-off saw consists of one saw only. A carriage mounted on trucks and rails is used to feed the wood to the saw. This carriage is equipped with rollers which serve to move the logs forward as pieces are cut off. The carriage is moved back and forth to the saw by means of a steam piston. The speed is regulated by the operator according to the size of the logs. From four to six logs can be cut up in this manner.

Removing the Bark

After the logs have been cut into the required lengths the bark is removed. In earlier days this

was done by hand with draw knives. This method, however, was very costly and led to the invention of mechanical barkers consisting of a revolving disc having knives placed on the face. These discs were made to revolve, and the blocks placed against the knives which removed the bark. This method also proved to be too expensive because the mechanical barker not only removed the bark but also a large portion of the good wood.

With the ever decreasing supply of wood and the consequent rise in the cost, the disc barkers had to be discarded for something more practical. This led to the invention of what is known as the drum barker. Drum barkers are simply cylindrical vessels built of steel, mounted on heavy rolls and pillow-block bearings. They are usually made in several sections and provided with restraining partitions so that only the wood can pass from section to section, while the bark is made to pass out through openings provided for that purpose. The drums are caused to rotate. Consequently, the blocks tumble against each other, removing the bark without any waste of wood. The capacity of one of the larger sizes is from 150 to 200 cords a day.

Chipping

After the barking operation the wood is inspected and such pieces as are not perfectly clean are returned to the drum. The clean wood is conveyed to the chippers and cut into chips about three-quarters of an inch long. These chips are screened to remove sawdust and slivers. The sawdust is used for fuel under the steam boilers while the slivers are put through a re-chipper where they are cut into the proper length. It is essential that the chips be of uniform size in order to produce a uniform quality of pulp. This will be referred to later when cooking and screening are considered.

Acid Making Process

The acid making process will now be considered. As stated before, the cellulose is produced by boiling the wood in acid compounds. The acid used is known as calcium bisulphite from which the process derives its name. It has the chemical formula Ca $(H_2SO_3)2$.

The making of acid is an important feature of this process. The color of the pulp largely depends upon the correct chemical composition of the acid. There are two distinct methods for making this acid. One is known as the tower system and the other the milk of lime system. The tower system consists of large concrete or wooden towers. These towers are usually made about eight feet in diameter and as high as one hundred and twenty-five feet. They are filled to the top with limestone or calcium carbonate. Water is pumped to the top and allowed to percolate down through the rock, while the sulphur dioxide gas enters at the bottom and is made to pass upwards. The chemical action which takes place causes the limestone to dissolve.

The milk of lime system usually consists of a steel tank about eight feet in diameter and twenty-five to thirty feet high. It is lined with acid proof material and divided into sections or compartments, usually four or five in one apparatus. Each compartment is equipped with distributing devices and overflow pipes for conducting the acid from section to section. In this system burned lime is used. This lime is dissolved in a water solution containing about one and one-half per cent of calcium oxide. This solution is referred to as milk of lime. It is pumped into the upper compartment or section of the absorption apparatus and overflows from section to section, while the gas is made to enter the lower compartment and made to travel in the opposite direction. When the lime water leaves the lower section, it is completely saturated with sulphur dioxide and is then ready for the cooking process. The sulphur dioxide used is obtained from two different sources. One is by burning pure sulphur in burners designed for that purpose. The other is by roasting sulphur pyrites in specially designed roasting ovens. In this country, on account of the abundance of pure sulphur, the pyrites are seldom used, while in European countries they are used almost exclusively.

The Cooking Operation

This brings us to the cooking operation. As I have said before, this is done in closed vessels under high pressure and temperature. It follows, therefore, that the vessels must be built strong in order to withstand the pressure, and made of acid proof material in order to withstand the action of the acid. These vessels are known as digesters. They are cylindrical vessels fifteen to eighteen feet in diameter and from fifty to sixty feet in height. They are made of steel plate and lined internally with an acid-proof material. This lining is usually from eight to nine inches thick.

In operation, the chips are delivered by an elevator from the screening equipment in the wood room to bins above the digesters, and the digesters filled by simply opening a slide in the bottom of the bins. After the digester is filled with chips, the acid is put in and a cover bolted on the top. The steam is then turned on through pipes which enter the bottom of the digester. The cooking process requires from seven to as high as twenty hours, according to what method is employed and the quality of pulp desired. In what is known as the Ekman or quick cook process, the time is usually from seven to ten hours, while in the Mitscherlich or slow cook process about twenty hours are required.

The cooking of the wood is the most particular process in the sulphite mill. It is here the quality of the pulp is determined. If the cooking is allowed to continue for fifteen or twenty minutes after the end-point is reached, the whole batch may be spoiled.

This is because ligno-sulphonic acids are formed when the sulphur dioxide acts on the lignin in the wood. These acids are taken up and neutralized by the lime in the acid. When the available lime is used up, these acids will act on the fiber and burn it in the same manner as would sulphuric acid.

When the cooking is completed, the digester is emptied into what is known as the blow-pit. This is usually a cylindrical tank provided with a double bottom; the upper bottom being perforated to allow the liquor to drain out. After the waste liquor is drained away from the pulp, fresh water is put on which washes away the remaining traces of liquid and acid. The wood is then in the form of pulp or cellulose. It is transported from the blow-pits to the screening process by means of centrifugal pumps. In order to handle the pulp by means of pumps, and in order to remove the uncooked wood, knots and dirt in the screening process, it is necessary to dilute the fibers with water and to make them very thin, the consistency being only about one-half of one per cent of fiber. After the pulp is screened, it is conducted to separators where a large portion of the water is removed, increasing the consistency to about five or six per cent. It is then conveyed to the bleaching department where it is bleached to a pure white by means of a solution of calcium chloride. It is again washed and screened, and, after screening, it is either pumped direct to the paper mill or passed through what we call wet machines where nearly all of the water is removed and the pulp transferred into heavy sheets containing about thirty-five per cent of pulp. It is then ready for shipment. Where the pulp is intended for long shipments it is usually dried to almost a perfect dryness in order to reduce the shipping weight as much as possible.

Quality Dependent on Many Things

The quality of the pulp depends on many different things, such as condition, age and kind of wood. Spruce is generally accepted as being the best material for making sulphite pulp. Hemlock, which is very dark in color, has a shorter fiber and makes a poorer quality of pulp. The better quality of pulp is also made from wood which is newly cut. If the wood is allowed to lay in wet places after being cut, for long periods, mould and rot usually set in which destroy the fiber. The uniform size of chips is a deciding factor in the quality and strength of pulp. If some chips are long and others short, the short chips will be acted on more severely in the cooking process and the fiber, consequently, injured.

The strength and composition of the acid are very important. If the acid contains too high a percentage of calcium, it requires a much higher temperature to complete the cooking. If the lime content of the acid is too low, the cooking will have to be discontinued before all of the lignin is dissolved, due to formation of ligno-sulphonic acids which are neutralized by lime and which consequently will destroy the fiber. It is recognized that a lime containing a high per cent of magnesium is essential for the better grades of pulp. The time, pressure, and temperature in cooking also are deciding factors. In the Mitscherlich process the cooking takes as long as twenty hours or more. In this manner the process may be done at the lowest temperature and pressure. These conditions produce a better grade of fiber.

To produce one ton of sulphite pulp requires the following:

225 pounds sulphur.

2¼ cords wood.

160 pounds lime or 300 pounds limestone with the tower system.

1,200 pounds coal.

350 pounds bleaching powder.

About 12 horsepower per day of power.

It may be of interest for you to know that there is being produced in the United States 5,500 tons of sulphite pulp a day, and in Canada 2,500.

Questions and Answers

Q. How expensive is the sulphur used in the making of pulp?

A. Sulphur costs about $25 a ton delivered at the mill; i. e., a long ton of about 2,200 pounds.

Q. Do we use more sulphur than they do in foreign countries?

A. On account of using the quick cook process in this country as against the slow cook in foreign countries we use more sulphur. Where the same method is employed there is no difference in the sulphur consumption.

Q. What is the life of a lining of a digester?

A. The life is from five to eight years, depending on the care it receives. One must be careful, if it is necessary to wash the digester, to use hot water. If cold water is used, the bricks will crack. The lining should also be examined from time to time and defective places repaired.

Q. You say there seems to be a variation in the cooking. How can one determine when the cook is ready to be blown?

A. We have several methods of determining what we call the end-point. One is by using the iodine test for sulphur dioxide. Another by matching colors. Still another by using ammonia. When a few drops of ammonia is put into the cooking acid there will be a precipitate as long as there is any lime in the solution. When there is no more lime in evidence, it is time to blow off the digester. The old sulphite cook, however, depends more on the smell than anything else. Even though the color or other tests are right he insists it should also smell right. The finished pulp has a peculiar smell which a skillful operator alone is able to detect.

Q. In what way does the Mitscherlich process differ from the usual process?

A. The Mitscherlich process is done by what we call indirect heat. The steam coils are placed inside the digester and the steam is not allowed to come in contact with the acid at all. In this manner the acid strength is preserved but it takes a much longer time to heat the digester. In the quick cook process, which is used almost exclusively in this country, the steam enters the bottom of the digester and the whole mass is brought to pressure and high temperature in a very short time. The advantage of the Mitscherlich process is better quality due to the slow process, while it follows that the high production is greatly in favor of the quick cook process.

15-Ton Cranes in Handling Wood Pulp

ARTHUR F. ALLEN
General Manager of the Tidewater Paper Mills Co.

EVERY pound of wood pulp that goes into our mill is handled by two 15-ton locomotive cranes. We are manufacturers of newsprint paper, which we supply to many of the big newspapers.

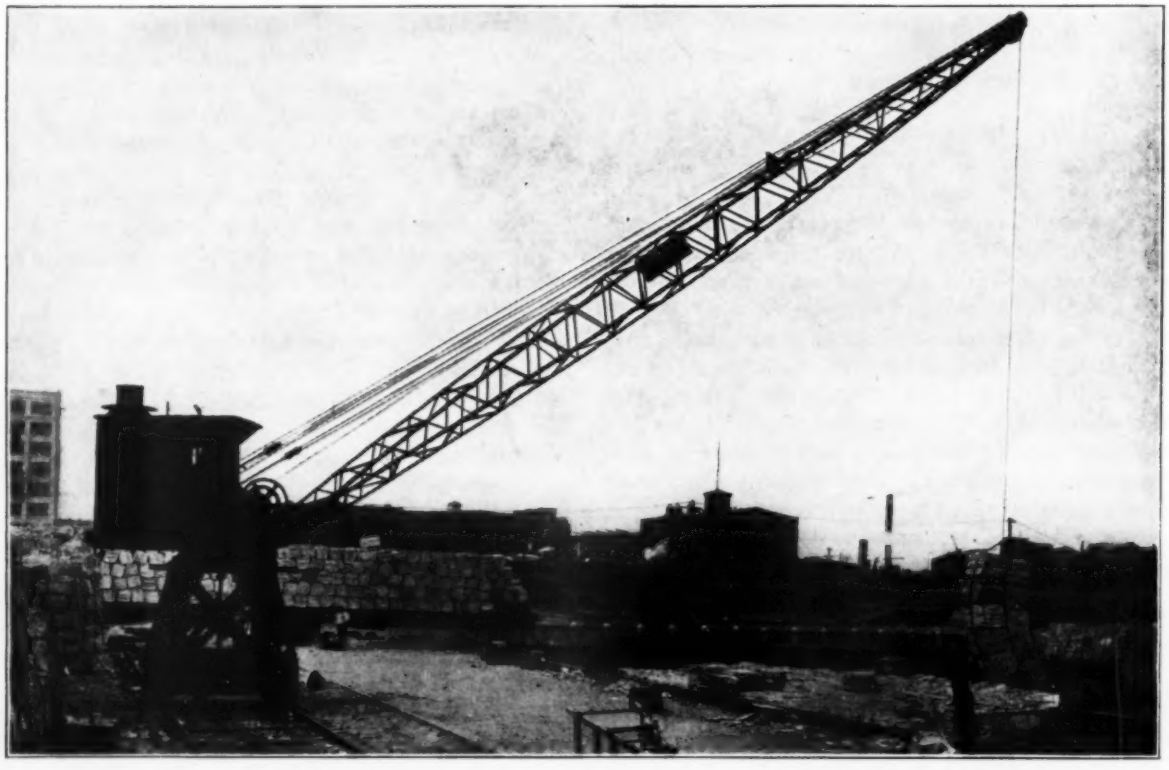
Most other paper manufacturers are located near the source of their raw material and far from their market. We, on the contrary, are located right next door to our market, but a long way from our raw material supply. While we can deliver paper to customers by motor truck, we have to get most of our wood pulp by the water route.

Our yard is a rectangle 400 feet long by 200 feet wide. Running its entire length are two parallel tracks, about 120 feet apart. Since both cranes have 60-foot booms, they can handle anything in the space between the two tracks, and also store wood pulp 60 feet to the outside of either track.

When the lighters, schooners and larger boats tie up at our dock we unload them with one of our two 15-ton cranes, using a wire basket holding about 2½ tons. After picking up a load from the boat, the crane carries it into the yard and deposits it on the storage pile. Ordinarily we have 10,000 tons of wood pulp in storage.

About 75 per cent of all our wood pulp is handled twice. The second handling consists in taking the wood pulp from storage and depositing it on a conveyor which carries it through the shredder. After that it is put in tanks and mixed with water before being pumped to the plant.

One of our cranes is of the standard locomotive type. The other has a specially constructed elevated base, which gives it a higher reach and enables the



operator to see down into the hatches of the ship. All our schooners and larger vessels are unloaded by this crane.

In a sense we have only work enough for one crane, but our production is directly dependent upon the continuous operation of our cranes. If we had only one crane and it should be laid up for a week, we should have to shut down the plant. Also having two cranes doubles our storage space, by giving us a crane on each track.

However, the main purpose of the second crane is to take care of the peak loads occurring when lighters and big vessels come in together. This is not unusual during the summer. At such times we have to handle 800 tons per day in order to avoid excessive demurrage and wharfage charges.

In the case of a schooner we are charged $100 a day demurrage if we detain the vessel over 10 days, and $50 a day wharfage in addition. A lighter must be unloaded at an average rate of 500 tons a day. One of our cranes can do this easily, but it takes two cranes to handle 800 tons a day.

The operating cost of our cranes cannot in fairness be compared with the costs of cranes that do but little traveling. Our cranes are running back and forth all the time and, of course, using much more fuel than if they were stationary. This also increases repair charges; in fact, 75 per cent of our repairs have been made on the traveling shaft.

Our cranes were five years old the first of 1921, and are still in good condition. We figure that they are good for at least 15 years, total life. Although they work 310 days per year, they stand up well under very hard service, and keep down repair bills. The two cranes cost $13,472.67 a year, exclusive of dock and yard labor. As their work is so similar we do not keep separate costs on them.

As we unload approximately 50,000 tons of wet wood pulp each year, and 75 per cent of this is handled again from storage to conveyor, the total handled yearly is 87,000 tons, making the cost 15.4 cents per ton. If we add the cost of our yard and dock labor, we have a total annual operating cost for two cranes of $38,472.67, or 44 cents per wet ton, all items included. This is a very satisfactory handling cost.

COST OF OPERATING TWO 15-TON CRANES
Tidewater Paper Mills Co.,
Brooklyn, N. Y.

Depreciation, $\frac{\$13,000}{15 \text{ years}}$ =	$ 866.67
Average yearly interest at $6\% = \frac{16}{15} \times \frac{\$13,000 \times .06}{2}$	416.00
Repairs and maintenance, cranes	4,400.00
Annual charges on track	1,100.00
Fuel	4,400.00
Crane labor, one man	1,900.00
Dock and yard labor	25,000.00
Taxes and insurance	390.00
Total annual operating cost	$38,472.67
Cost per wet ton = $\frac{\$38,472.67}{87,500}$	$ .4397
Annual cost, excluding dock and yard labor	$13,472.67
Cost per wet ton excluding dock and yard labor	$ .1540

Selling Scientifically and Manufacturing Methodically

By T. J. BURKE, C. A.
Secretary-Treasurer, Cost Association of the Paper Industry

"THE right goods at the right price" is a sign which I have noted frequently of late as appearing in the windows of many stores. It is a notice that strikes at the very root of things. The jobbers and retailers advertise as having the right goods at the right price, but what about the manufacturers? What steps do they take to make sure that they have the right goods at the right price? Taking your own case for example, are you satisfied that your products can be considered to be within this category? Not only, are you satisfied that they may be so considered, but are you absolutely sure that this is the case? In order to be quite sure you must have reliable figures, and now, to come to the climax of the matter, have you these reliable figures? What is your policy regarding your products? How have you formulated this policy?

In these days when business has to be stalked as carefully as one would stalk a deer, it is absolutely essential that every scientific aid possible shall be used. Up-to-date cost systems are essentially scientific aids to business, their usefulness lying in the fact that they help manufacturers to sell scientifically and to manufacture methodically, by enabling him to push, through his sales department, those goods on which he makes the most profit and to control through his production department, his output, so that it will keep pace with the sales made.

Paper must certainly be considered one of the so-called fundamental commodities today, and the only trouble with these commodities has been very largely one of price. Certainly the demand for paper has fallen off, but as stated above, it is a fundamental commodity and there must always be what might be called a basic demand which must be supplied. This basic demand has undoubtedly been kept at its lowest

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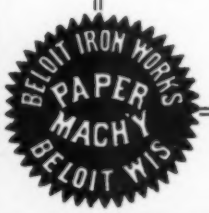

possible ebb, mainly on account of the general distrust of prices.

It is absolutely necessary that prospective purchasers be made to feel that prices will not go lower and that therefore their competitors will not gain any advantage over them by waiting a little longer. In other words, confidence must be inspired in prospective buyers. The dictionary definition of "confidence" is given as "trust" or "reliance." I ask the question, how can prospective purchasers be expected to put reliance in the prices quoted when there are such big variations and so many changes. Undoubtedly some of these changes are due to what may be called fundamental reasons, but many of them are due to a desire to get business at any price and therein lies the danger. To build up "confidence" is one thing, to play the "confidence-game" is another. To go back to the dictionary, the definition given of "confidence-game" is a swindling scheme to get money. That's rather a strong expression to use in connection with the manufacturers who sell their products below cost, but if we give the matter serious attention and consideration, it would appear that the term "confidence-game" approaches very closely what they are doing. They are attempting to build up confidence by resorting to unfair methods of business, for manufacturers who sell their products at less than cost price are resorting to unfair methods of business, inasmuch as they know quite well that there must come a time when they will no longer be able to sell on the same basis. What they hope to do is to secure business at the lower basis, and then, after having lulled the purchaser into a feeling of security, to gradually work on to a high price basis.

That manufacturers may sell their products at slightly below cost with the hope of keeping their organization together and taking care of their overhead thereby eliminating the heavy cost of shutting down is, of course, perfectly legitimate, but what might be termed illegitimate competition is competition from manufacturers who cut prices below this mark. There are not many manufacturers who are frankly willing to do this, but there are many manufacturers who do it nevertheless, simply because they do not know what they are doing. How can they know, since they have to wait until perhaps the end of a six months' period before they can state definitely whether they have made a profit or a loss? In the meantime, by means of rule of thumb methods, they endeavor to ascertain how things are going. Naturally such a method breeds fear, and a man who is afraid of what may be in store is not in a position to use his best business judgment. He generally decides that whatever else he does, he must keep the mill running. He feels that as long as there is something to do that he must be better off than he would be if he were shut down altogether, because then his equipment would be idle and earning him nothing, whilst as long as his machines are running, even only part time, he feels that they are earning something for him. What he overlooks is the fact that whilst he would be losing his fixed charges and could not expect any interest from his investment whilst his mill was shut down, yet the goods that he manufactures and sells may mean a much bigger loss to him at the prices he quotes, inasmuch as the cost of the raw material and labor which he has to put into those goods may not all come back to him but only a part thereof and his loss will thus be increased.

Knowledge Is Power

These are all very simple facts known to a great many and yet there are still manufacturers who are not convinced of the benefits which they would derive from an up-to-date cost system. They much prefer to take these big risks, because forsooth they might have to add the expense of two or three extra clerks and one good cost manager. Knowledge is power, and a proper knowledge of your production costs must and will mean a better ability to do business. Right here I would like to urge the necessity for a really up-to-date cost system. Such methods for instance as "distributing overhead expenses in accordance with the percentage of direct labor" cannot be called scientific nor reliable. I therefore urge all manufacturers of paper when taking up this cost question to make a good job of it and to get the best possible advice. Do not employ a cost man because a friend told you he was a good bookkeeper. Very big strides have been made by cost accountants in recent years and the leaders amongst them are very far-seeing clever accountants.

Strangely enough, manufacturers have never had to be persuaded very strongly, of the necessity for getting the best salesmen available and they have always been willing to pay the salesmen big salaries. Undoubtedly the best ones are worth the salaries they receive because they will supply the manufacturer with a lot of useful information regarding the possibilities for selling his various products in different territories. Now if any manufacturer has a scientific cost system he is in a position to work out, on a scientific basis, just what price he can quote in those various territories for the products likely to sell best there and how those prices compare with the prices quoted by his competitors. In this way he can pick and choose the most profitable business and this is the business, which it is all the more desirable and necessary to have, at a time when the mill is running below normal.

There never was a time when the profits to be derived from a properly constructed and well thought out cost system were greater, nor could be used to better advantage. Such large companies as the International Paper Company, American Writing Paper Company and others have been thoroughly convinced on this point and have spent many thousands

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The making of dyestuffs, the most complex of all industries, requires not only great resources, but vast chemical knowledge. It is fitting, therefore, that the Du Pont Company, with over a century of accumulated chemical experience, should assume a large portion of the burden of providing the United States with a self contained dye-making organization.

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of dollars in perfecting their cost organizations. They fully realize the benefits that would accrue to the pulp and paper industry as a whole, if all the manufacturers in the industry could be brought to a realization of these benefits and that is why they are supporters of this Association. I have sometimes had it said to me by a small manufacturer "Well, I can understand a large company like that wanting a cost system, because it is not possible for them to give the personal supervision to their different departments that I can give." This is the kind of man who is very difficult to convince. He points to the fact that he has always made money, or until recently, and further states that he expects to do so in the future. He seems to overlook entirely the possibility that he might have made a good deal more money than he has if he had manufactured on a methodical basis, so that he produced just those products, which his salesmen could sell at the largest profit.

After all, it is merely a matter of "common sense," and when manufacturers generally recognize this, there will be less hesitation about realizing the importance of the Cost Department. Unfortunately, there have been failures amongst the cost men, just as there have been failures in every other line of business. Nevertheless, the bulk of the systems installed have been very successful and I can give quotations today from a large number of presidents of well-to-do companies clearly setting forth their belief in cost systems and their reasons for this belief. I know that all these manufacturers will be represented at the Convention which this Association will hold at the Drake Hotel in Chicago on October 6th and 7th next. They are doing fine work by spending their time and money in an endeavor to place the pulp and paper industry on a sound economic basis, by impressing upon the manufacturers within that industry, the importance of the cost question and the necessity for installing up-to-date cost systems in their mills. Instead of playing the "confidence-game" they are striving to restore "confidence" in general.

This confidence has been somewhat rudely shaken by the slashing of prices which has taken place within recent months. This cut-throat competition could be eliminated by the adoption of uniform cost accounting systems such as are in use in many associations today. I seriously urge groups of manufacturers making the same products to get together and tackle this problem seriously. Like a good many other problems, it looks much larger than it really is. No one questions now the very large benefits that have accrued to the printers through the excellent uniform cost accounting system which has been adopted throughout that industry. Whilst talking to a gentleman who was connected with the United Typothetae of America for many years recently, I learned that they were expending over $2,000,000 a year in giving service to their members. Surely the plup and paper industry is as big a one as the printing industry, since the latter could not exist without the former. If the printers can afford to spend $2,000,000 a year, surely the pulp and paper manufacturers can afford to spend the small amount necessary to have uniform cost systems adopted by each of the different groups within the industry and most certainly it would prove to be one of the most profitable investments possible.

Pulp and Paper Screens

A Comment

"IN your July issue of the Paper Industry you have an article Pulp and Paper Screens, by Mr. Phillip Dennett. He makes in this article a statement that we would like to take exception to. He says under heading Two Chief Types of Pulp Screens that a third type, the inward flow rotary screen has been used to some extent, mostly in Europe, but it has not gained any large success.

"In later years there has been developed in Sweden an inward flow rotary screen that has proven to be a decided success in screening of pulp, as well as in connection with the paper machine. I am now referring to the P. A. P. A. screen invented by Mr. Spangenberg. A great deal of the higher grade pulp, sulphate as well as sulphite imported to this country is screened over this screen.

"We have in this plant one screen of the above type in operation, and have no difficulty in screening somewhat over twenty tons in twenty-four hours on said screen, with a power consumption of 5 H. P.

"C. C."

Engine Room Pointers

Reducing valves that are too large for the amount of steam they are to pass are usually unsatisfactory. Either they will open and close continually and chatter violently, or will stand in a position nearly closed and become steam-cut and leaky. It is more satisfactory to use two small valves in parallel, one set slightly heavier than the other, so that one will supply steam up to its maximum capacity before the other opens. Another way is to use one reducing valve equal to about one-half the maximum demand, and a bypass of about the same capacity with a hand-operated valve in it, so that when the reducing valve reaches its capacity, the bypass valve may be opened wide, and the reducing valve will close down and simply make up the shortage. This, of course, requires that an attendant shall observe the pressure gauge occasionally.

In changing the speed of an engine, care should be taken to adjust the governor springs so that the sounds, when they are tapped with a hammer, will be as nearly alike as it is possible to get them. If the sounds are different it is a case of unequal tension, which will result in unequal strain and may cause racing.

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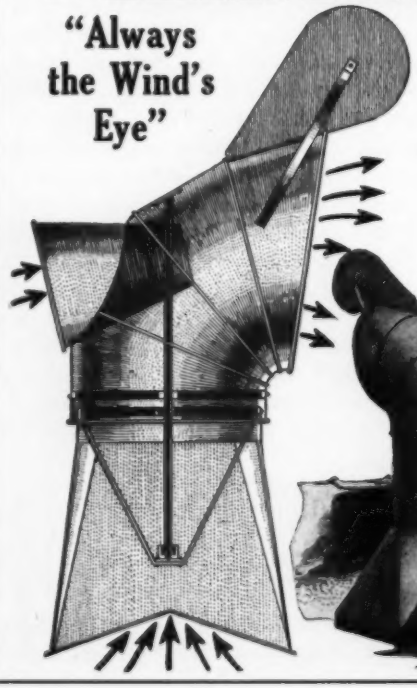

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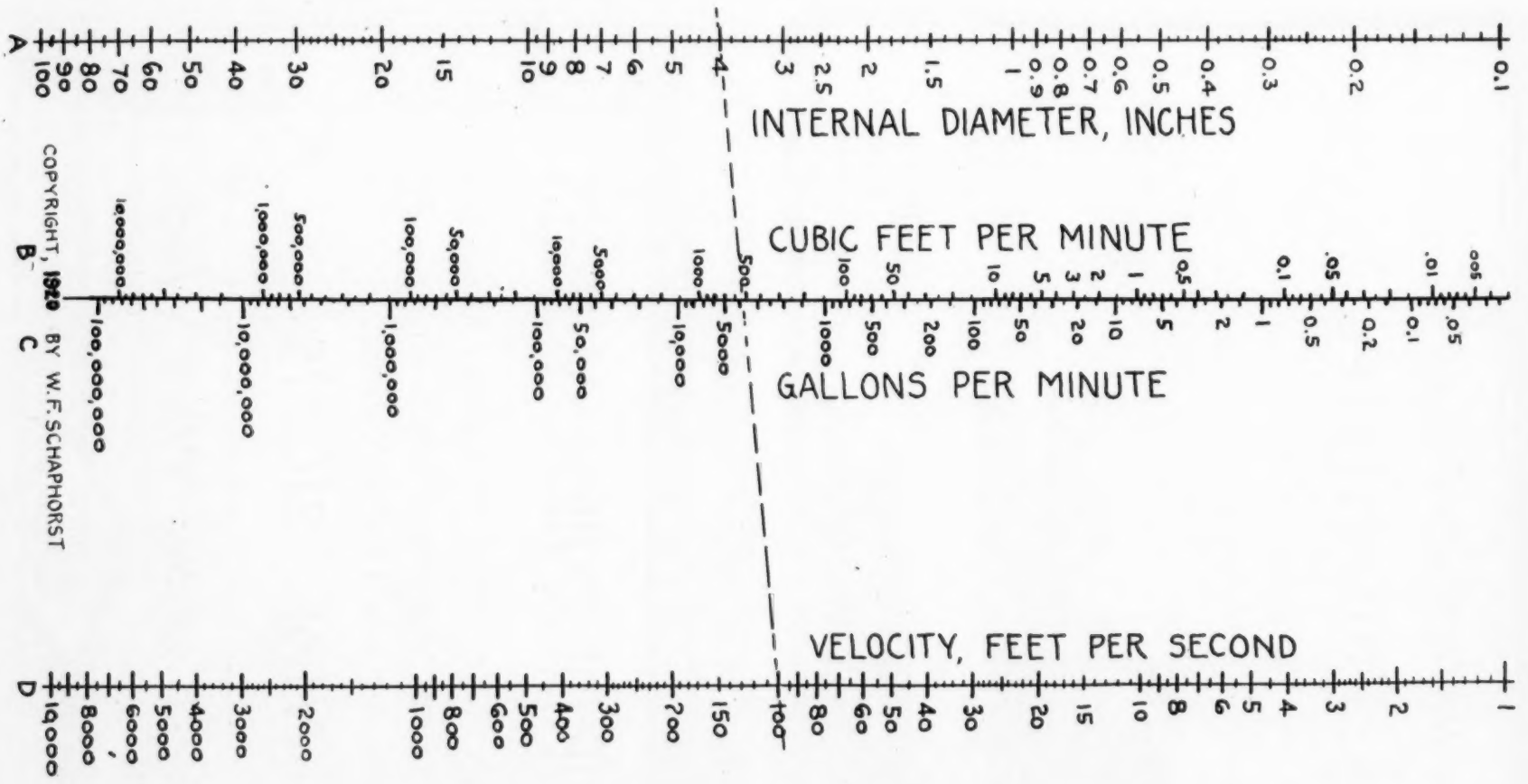

A Handy Chart for Determining the Flow Through Pipes

BY simply laying a straight edge across the accompanying chart any one of these questions may be answered:

1. How many cubic feet will flow through a pipe of known internal diameter at a given velocity?

2. How many gallons?—other conditions being the same as in (1).

3. What will be the velocity in ft. per second, knowing the diameter and cu. ft. of flow per minute?

4. Same as (3) except that the flow is given in gal. per min.

5. What diameter of pipe must be used to carry a given number of cu. ft. per min. at a given velocity?

6. Same as (5) except that quantity is in gal. per min.

For example, how many gallons per minute will flow through a 4-inch pipe at 100 ft. per second velocity?

The dotted line shows how it is done. Connect the 4 (column A) with the 100 (column D) and locate the intersection with the middle column. Column C tells us the answer—very close to 3,900 gallons per minute.

The range of the chart, it will be noted, is very great. It will handle a water velocity as low as 1 ft. per second, and a steam or gas velocity as high as 10,000 ft. per second. The range for pipe diameters runs from $\frac{1}{16}$ inch to over 8 feet. The maximum flow shown on the chart is 100,000,000 gallons per minute, or over 10,000,000 cubic feet.

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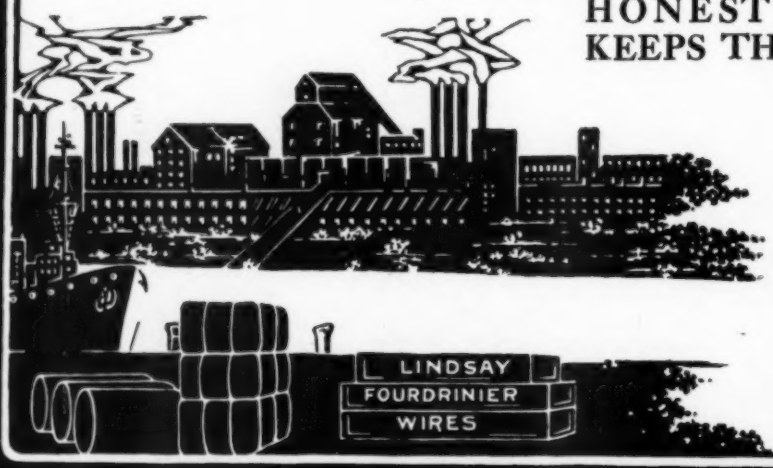

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Temperature Regulator Chart

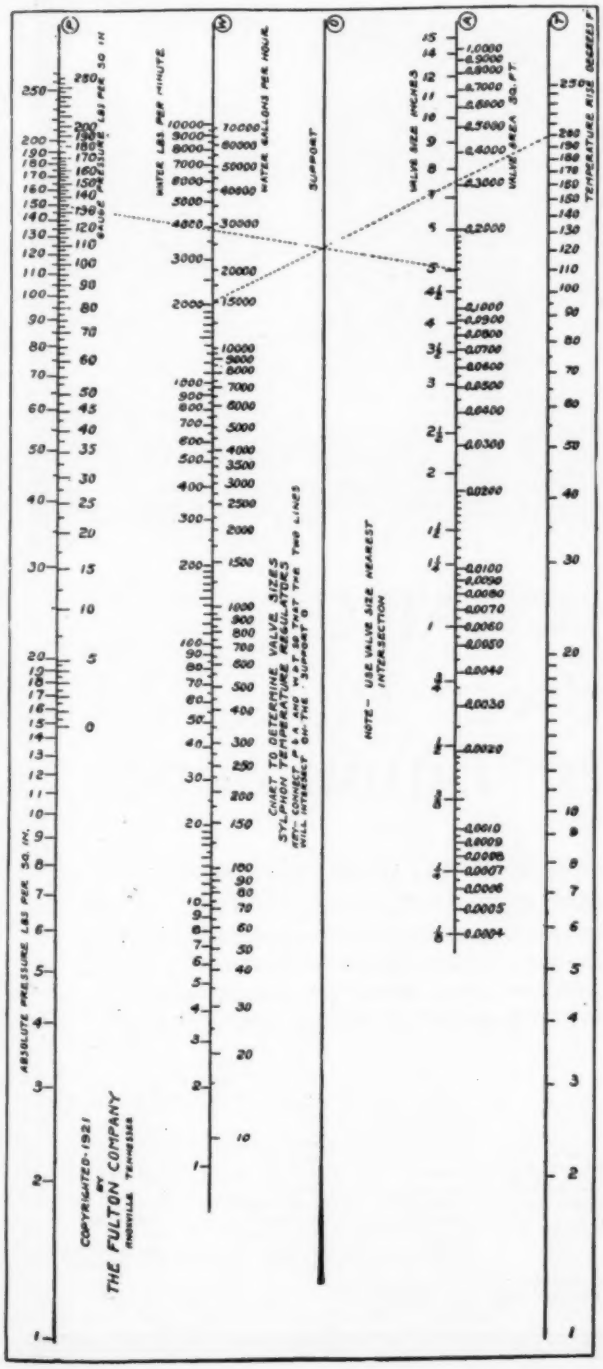
THE accompanying chart shows four quantities which are usually considered in calculating temperature regulator sizes, namely:

P—Steam pressure, lbs. per sq. inch.

A—Valve size (area in sq. feet).

W—Quantity water heated (lbs. per minute or gallons per hour).

T—Temperature rise of water degrees F.



This chart is applicable to Sylphon temperature regulators only, manufactured by the Fulton Company, of Knoxville, Tenn., and has been gotten up at the request of many engineers with a view of enabling them to specify proper sizes of Sylphon tank regulators.

When any three of these quantities are known the fourth may be calculated, and they have been plotted graphically in this chart which makes the problem simple of solution.

Five vertical parallel lines of which four are indicated by the letters above and marked thereon have all the values ordinarily used in temperature regulation problems. The fifth parallel line marked "O" is known as the "Support" and is used only as an auxiliary line. For instance, lines connecting "T & W," and "P & A," must intersect "Support" "O" at the same point to get a correct solution, as shown by the dotted lines on chart.

Example:

Suppose 15,000 gallons of water per hour are to be heated from 40 deg. F. to a temperature of 240 deg. F. The steam pressure is 135 pounds per square inch gauge. Required, the size regulator necessary.

The temperature rise is 240 deg. — 40 deg. = 200 deg. F.

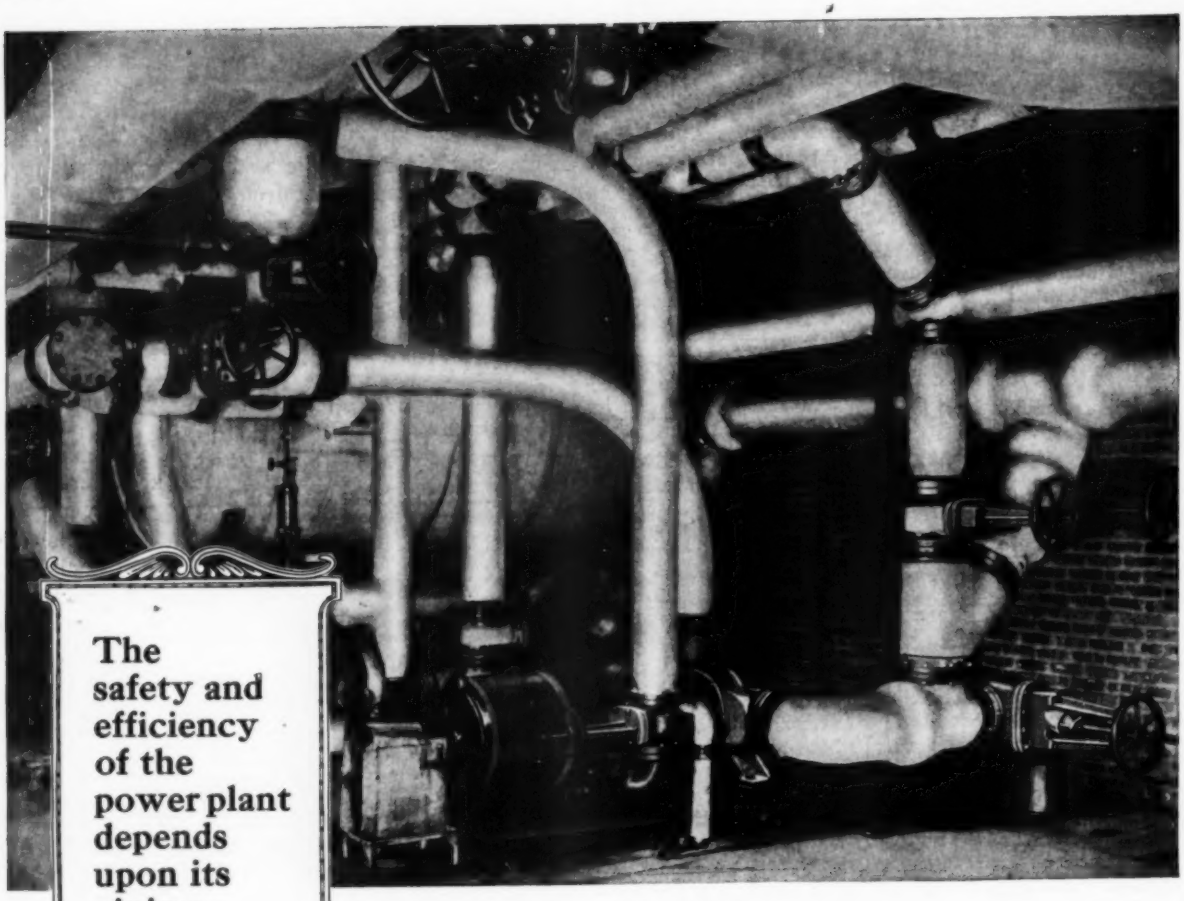
With a straight edge connect 15,000 gals. on "W" with 200 deg. F on "T." Note the point where this line intersects the "Support" "O," connect with 135 pounds on "P," and prolong until it intersects "A," which gives the required valve size, 5 inches. Use the valve size nearest the intersection at line "A."

A valve for any one quantity may be found when the other three are known. For instance, when the steam pressure, valve size and quantity of water are known, the temperature rise may be checked.

Where a long run of pipe is necessary to bring steam to the regulator, the pipe should be one size larger and reduced at the regulator.

How to Clean Files

After removing loose dirt with a stiff brush, files can be cleaned of grease by boiling them for about 45 min. in a solution consisting of ¼ lb. of saleratus to a quart of water. The files are then thoroughly washed in clean water and dried and placed on end, completely submerged in a solution consisting of ¼ lb. of sulphuric acid to a quart of water. After remaining in the acid solution for about 12 hrs., the files should be thoroughly washed in clean water, quickly dried and given a light coating of kerosene or other thin oil to prevent rusting.



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Responsibility for Industrial Accident Prevention

By GEORGE P. HAMBRECHT

Chairman Industrial Commission of Wisconsin

The following article outlines the laws regarding safety in the state of Wisconsin. In that state the responsibility for safety is placed on the employer whose position in the matter is clearly defined by the author. —Editor.

CAREFULLY prepared statistics show that approximately 80,000 persons are killed in the United States by accidents each year from all causes, on the streets, in homes, and in the industries—222 each day of the year. The total number of persons injured in one way or another is not known.

Figures compiled by the National Safety Council show that in the year 1919 more than 22,000 persons were killed as the result of accidents in American industries, and that over 500,000 persons were so severely injured that they were maimed or disabled for life or were forced to lose four weeks or more of time.

It is often said that the casualties resulting from the World War were actually small in comparison with the yearly industrial casualties. In the nineteen months during which the American Expeditionary Forces participated in the World War, 77,118 men lost their lives and 302,612 casualties of all kinds resulted. Reduced to a yearly basis, the deaths occurred at the rate of 49,000 per year and the total casualties at the rate of 190,000 per year. In the words of the National Safety Council: "To appreciate fully the great toll in human life taken by accidents daily, it is necessary to imagine ourselves confronted with two wars each as deadly, so far as the United States is concerned, as the recent World War. In other words, accidents—three-fourths of which are avoidable—are wiping out daily twice as many lives in the United States as were sacrificed by our soldiers and sailors, on an average day, during the recent World War."

In 1919 there were 1,349 accidental deaths in Wisconsin, of which number more than 80 per cent occurred outside of industry. The total number of accidents is unknown, but there were no less than 18,441 compensable industrial accidents reported to the Industrial Commission during this year. This means an average of 1,535 per month, 60 per working day, 6 per hour, or one every 10 minutes. The accidents in 14,995 cases settled under the compensation act during this year caused a time loss of more than 2,870,438 working days, and a financial cost to employers for indemnity and medical aid of $2,163,-354. Only accidents which cause disability of more than seven days' duration are compensable, and the number of minor injuries is probably twice as great as the number of compensable accidents. There is no doubt also that the number of non-industrial accidents greatly exceeds the number of industrial accidents. The total money loss to employers and employes from industrial accidents probably exceeds $10,000,000 per year in Wisconsin.

While Wisconsin has accomplished comparatively a great deal along the line of accident prevention in industry, still a large number of accidents occur each year. Much remains to be done toward making employment and places of employment safe.

Work of Industrial Commission

Where does the responsibility for safety lie? That there is much misunderstanding on this point is indicated by the inquiries and correspondence which come to the commission from time to time.

The Industrial Commission is frequently called upon by employers to furnish them with a letter or certificate of some kind stating that their plants conform to all of the safety requirements outlined by the commission. Such requests usually follow as a result of the visit of one of the commission's deputies to a plant. The deputy makes an inspection, finds certain hazardous conditions, points out violations of the commission's orders, makes a record of them on forms provided for that purpose, leaves a copy of his findings with some agent of the employer, confers with him concerning the hazards found, makes recommendations as to how they may be eliminated, arrives at an agreement with the employer's agent as to a reasonable time for removing the hazards, and then specifies some date by which the hazards and violations indicated are to be corrected and removed.

Frequently, in the case of some employers, the deputy, upon reinspection, finds that little attention has been paid to his recommendations and that practically nothing has been done to eliminate the hazards which were pointed out. More or less reinspection and correspondence are then necessary and sometimes prosecution to gain compliance with the law. But in a very large number of cases employers promptly correct all conditions to which the deputy

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ESTABLISHED 1873

has called their attention, it being their sincere desire to have their plants as free from hazards as it is possible to make them. This latter class of employers, wishing some form of official approval of their action, ask for letters of compliance as stated above. In some instances it is the hope of employers that such letters will serve as a form of protection or insurance, in any contingency, against the payment of 15 per cent additional compensation provided for in the workmen's compensation law in case of any accident that might thereafter occur in their establishments, regardless of the cause of the accident. It is a very natural desire on the part of employers to ask the commission to write such letters showing compliance with its orders, and the viewpoint of such employers in this matter is fully appreciated. However, the commission does not deem it advisable to issue such letters for a number of reasons and has never done so. They would be extremely misleading to employers, and the commission, therefore, is glad of the opportunity to explain the true status of industrial accident liability.

Responsibility for Safety on Employer

The legislature has adopted a very definite policy, making the employer responsible for the safety of his employes and of his place of employment. (See Section 2394-48, and paragraph 1 of Section 2394-49 of the Wisconsin Statutes.) This policy is probably based upon the broad ground of intimate acquaintance with and control over the conditions of employment on the part of the employer. The legislature has also fixed, in great detail by statute, the rights of injured employes, and provides for 15 per cent additional compensation when an accident happens under certain circumstances, hereinafter described, and charges the employer with full responsibility. The Industrial Commission has no power, even if it were thought advisable, to relieve the employer of this responsibility nor to change the statutory rights of injured workmen.

Under these circumstances, it will readily be perceived that a letter from the commission stating that an employer has complied with all the statutory requirements on safety and with all the orders provided by the Industrial Commission in its several safety codes, would not relieve him from paying the fifteen per cent additional compensation to an injured workman if in fact such employer had not complied with all the safety standards, and which non-compliance had caused an accident resulting in bodily injury to one of his workmen. The legislature fixes the rights of injured workmen in the compensation law in a very definite and certain manner, and, among other things, this law provides for 15 per cent increased compensation where, in fact, the injury is caused by the failure of the employer to comply with any statute of the state or any lawful order of the Industrial Commission. (See Section 2394-9(5)(h) of the Wisconsin Statutes.)

Each accident to a working man must be viewed and disposed of in the light of all the surrounding and relevant facts and circumstances. If the event shows that the accident occurred through failure of the employer to comply with any statute of the state or any lawful order of the Industrial Commission, the injured employe is entitled, as a matter of law, to 15 per cent additional compensation. This is true, even though the failure of the employer be from lack of knowledge, oversight, inadvertence, negligence, or from any other cause. A previous compliance letter from the commission could not relieve an employer in such circumstances. On the contrary, a letter of the tenor suggested might work great harm to him by giving him a false sense of security, which might result in dangerous relaxation of safety vigilance on the part of any one within the employer's organization.

The legislature places the entire burden of complying with the safety statutes and orders of the Industrial Commission on the employer, except certain safety practices placed on employes (see Section 2394-9(5)(i)(j)(k).) The commission sends safety deputies into the field to advise employers and employes of their respective responsibilities and to point out, insofar as comes to the notice of these deputies, non-compliance with the safety laws. The commission hopes and believes these deputies are doing their work efficiently and well. Nevertheless, the work of the deputies cannot displace the responsibility which the legislature places upon the employer to furnish a safe place of employment. When an accident happens because of the non-compliance with the safety laws of the state, someone must bear the additional compensation burden. The legislature has placed this additional burden upon the employer, and, under certain circumstances above referred to, on employes, but not on the Industrial Commission.

The statutes of Wisconsin are so framed that even if the industrial commission fails in its full duty with reference to calling the employer's attention to all violations of safety laws and orders, through its force of deputies, and if the employer also fails in his duty and is lax with reference to the responsibility placed on him by the legislature in complying with the safety laws and orders, still the injured workman has a right accruing to him under the compensation law for 15 per cent additional compensation, if in fact the injury was caused by the failure of the employer to comply with the safety statutes of the state or lawful orders of the Industrial commission. This provision of the statutes is a recognition of the equity of the proposition that the injured workman should not suffer in his rights by reason of the mistakes or failure of other parties. This 15 per cent additional compensation merges into and becomes part of the basic compensation due to the injured workman, when the accident happens as above outlined. This is true regardless of any excuse that may be urged

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Paper Mill Machinery

by the employer for non-compliance. The 15 per cent increased compensation due the injured workman is independent of, and in no wise related to, the provisions made in the statutes for the penalties referred to in the next paragraph.

Penalties for Non-Compliance with Safety Laws

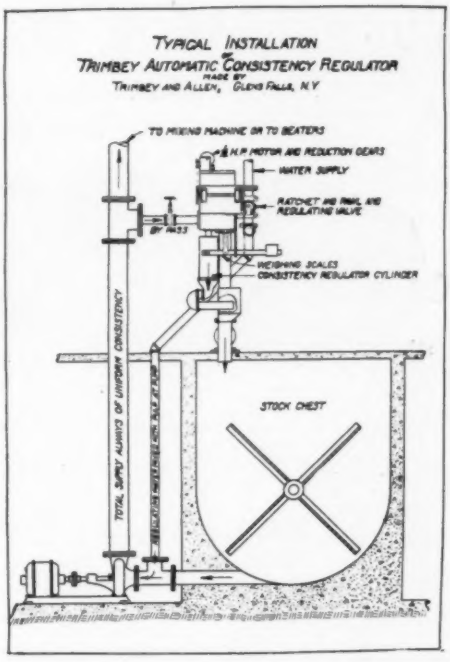
One of the duties placed by law upon the commission is to report to the attorney general for prosecution all employers who refuse to comply with the state safety laws and orders. The purpose of this procedure is to impress upon the mind of the delinquent employer the necessity of complying with the safety regulations, and it is made drastic and effective through the enforcement of statutory penalties incurred by his refusal. These statutory penalties are from $10 to $100 a day for each violation, for every day the violation continues, and when so imposed are paid into the state treasury and inure to the benefit of the state. These penalties, for which the employer is liable, must never be confused with the provisions in the workmen's compensation act for the increased compensation due an injured workman, because of the employer's failure to comply with the safety laws and orders referred to in the preceding paragraph. It is with great satisfaction that the commission is able to say that it has seldom found it necessary to resort to court action for the collection of the statutory penalties. Such resort is had only when all other means have failed to secure compliance with law. "Advise and Assist" is the commission's slogan in this work, and the response of both employers and employes has been and is most gratifying.

Safety Code Given to Each Employer

The commission furnishes to each employer copies of safety codes applicable to his business and most Wisconsin employers doubtless have on file the copies which were mailed to them in the commission's regular course of procedure. These codes were sent to employers so that they might know themselves whether or not their plants conform to safety standards. The principal codes and state laws in which employers are most likely to be interested, covering safety and other matters, are the general orders on safety, the building code, general orders on existing buildings, general orders on safety in building construction, general orders on sanitation, the industrial lighting code, the refrigerating plant code, the code of boiler rules, the elevator code, general orders on fire prevention, women and child labor laws, and the workmen's compensation law.

The provision for increased compensation, where injury is caused by the failure of the employer to comply with any statute of the state or any lawful order of the Industrial Commission, may be found on page 17 of the workmen's compensation law. In the event that any employer has mislaid the copies

Why Guess at Consistencies?



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It will hold stock at a maximum variation of less than 0.2% consistency as pumped to mixers or beaters.

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Let us help you figure out your Spur Gear and Worm Gear Reducer Problems.

WE DO IT FOR OTHERS, WHY NOT FOR YOU?

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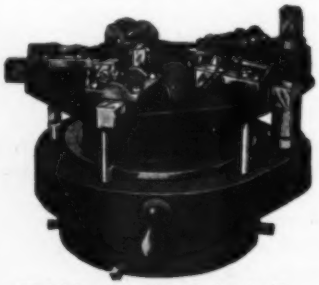
Fast, accurate pipe-fitting with "Toledo" Pipe Tools

THE "Toledo" line of Threaders, Cutters and Power Drives represents pipe-fitting equipment which cannot be equalled for accurate work, fast performance and general utility. They are ideal for quick emergency work and equally capable of handling the biggest, most complicated pipe fitting jobs. Send for catalog and Power Drive bulletin.

"Toledo" adjustable geared threader No. 2, capacity 2½ to 4-inch pipe inclusive. A light, portable device that threads fast and accurately. Other adjustable hand threading devices for pipe from ⅛ up to 12 inches.



"Toledo" geared adjustable threader No. 25, capacity 2½ to 6-inch pipe inclusive. The patented construction of this threader eliminates weaknesses generally found in devices where camplate principle is used for die adjustment to various sizes.

"Toledo" Power Drive for operating "Toledo" Geared Pipe Tools

Cut to left shows "Toledo" Drive operating "Toledo" Cutter No. 250. Capacity of cutter is 2½ to 6-inch pipe inclusive. Cuts clean and straight, leaving no burr. Power Drive is interchangeable and will drive ALL "Toledo" geared tools; it is simply constructed, portable and will operate any tool FIVE times faster than hand operation with ratchet handle or driving cross.

THE TOLEDO PIPE THREADING MACHINE CO. TOLEDO, OHIO

NEW YORK OFFICE: 50 CHURCH STREET, NEW YORK CITY

of the commission's codes which may have been sent to him, or if he has never received them, he may obtain any or all of them by writing to the commission. There is no charge for these.

The commission knows of the splendid attitude of a large number of Wisconsin employers with reference to safety in their plants, and this article is in no wise meant as a reflection on them. It is written rather as a brief summary of the rights and responsibilities of employers, employes and the Industrial Commission. The commission feels sure that this resume will be received in the same spirit in which it is written. The desire of those employers who ask for letters of compliance to have their plants 100 per cent perfect in safety, is thoroughly appreciated by the commission, and its deputies will co-operate with them in every way possible to bring this condition about.

There is an old saying, and one applicable to all cases of litigation, that "Ignorance of the law excuses no one." This may seem like a harsh rule; nevertheless experience has shown that this is the only practical way by which laws can be effectively administered. The commission appreciates the problem with which the employer has to deal and, while it cannot assume any part of the responsibility placed by law upon the employer and employe, it does aim, insofar as lies within its power, to acquaint both the employer and employe with the requirements of the safety laws and to assist them in meeting those requirements to the end that the suffering and losses caused by industrial accidents may be reduced to a minimum.

This detailed explanation is made so that employers may not be misled with reference to the responsibility of every employer for accident prevention which the laws of our state have placed upon him. No part of the responsibility placed on the employer can be shifted and nothing can take the place of eternal vigilance on the part of all—the employer, the employe and the Industrial commission—if the industrial accident frequency in this state is to be reduced.

Babbitt metal should not be used over and over again for the reason that every time babbitt metal is melted some of the tin and antimony is burned out. The scum that appears on the top of the metal when it is heated is an oxide formed by the combination of the metal with oxygen from the air.

A sales engineer knowing his business well enough to helpfully discuss the power or steam problem, sometimes lacks the tact or courage to meet the indifference, to use no stronger word, of the occasional superintendent or owner who dodges behind "I'm from Missouri" (meaning as used) "Don't show me."

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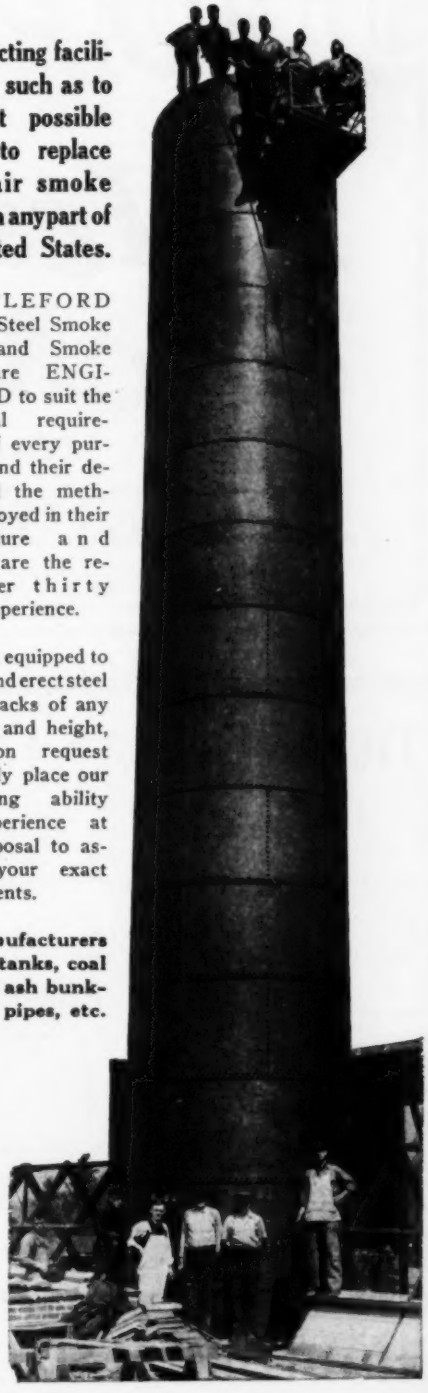
We are equipped to furnish and erect steel smoke stacks of any diameter and height, and upon request will gladly place our engineering ability and experience at your disposal to ascertain your exact requirements.

Also manufacturers of steel tanks, coal bunkers, ash bunkers, coal pipes, etc.



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Your Power by the Ton with the Ordinary Beating Engine. Install an UMPHERSTON BEATER and Save Power on Every Pound of Stock.

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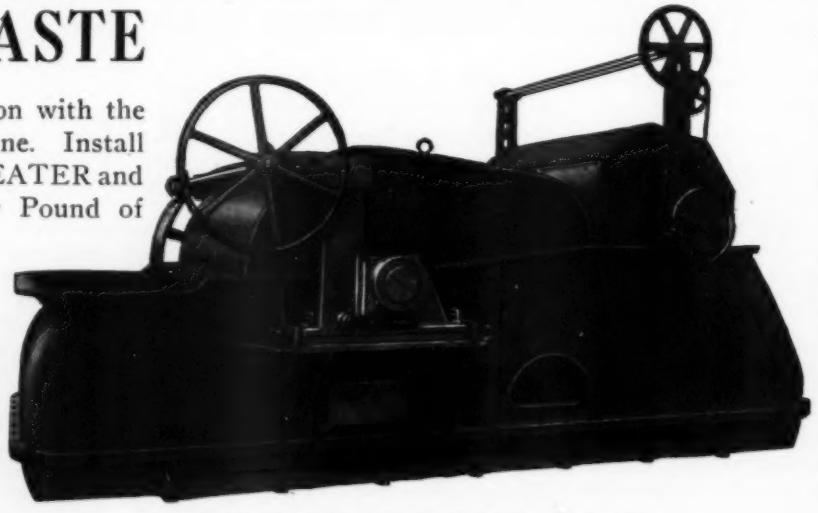

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Information and Booklets describing our Specialties sent to you on request

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SOME OF THE "HOLYOKE" SPECIALTIES—Chilled Iron Rolls, Cotton Rolls, Paper Rolls, Wood Pulp Grinders, Wood Barkers, Wood Chippers, "Umpherston" Beaters, Rag and Paper Dusters, Washing and Beating Engines, Reeling Machines, Hydraulic Pumps, Hydraulic Presses, Coated Paper Strainers, Turbine Wheels, Gearing and Shafting, Calenders, Platers, Rag Cutters

Tenth Annual Conference of Hammermill

Held on August 23, 24, 25, and 26, 1921, at Erie, Pa.

THE first decade has passed since the Hammermill Paper Company of Erie, Pennsylvania, called their first meeting of agents who handle their products, into conference. During the past ten years the name of Hammermill has rapidly become more and more established over the United States until now it is representative of all that stands for quality in writing papers and covers. Their bond papers are said to be the most extensively used of any that are on the market today. All this has been brought about by the continual cooperation between manufacturing end, sales and advertising divisions and the agents who actually sell the goods.

There was a marked contrast between the Tenth Annual Conference, just closed, and that of last year. The problem confronting the agents and Mill was not like it was in August of 1920, when the greatest difficulty was the supplying of agents with enough paper to keep their customers satisfied. The problem has now become one of deferred demand existing on the part of the consumer and the consequent necessity of having to fight harder for the business obtained.

However, the Hammermill family is equal to this situation as was evidenced by the spirit of confidence exhibited by the hundred and twenty-five or more who attended the Conference. New plans were laid out for the coming year, and among them there was none more auspicious than the agreement entered into with the White and Wycoff Manufacturing Co. of Holyoke, Massachusetts, whereby this well known company will put Hammermill Bond on sale everywhere in the form of papeteries, tablets and typewriter paper. It is expected that this action coupled with the general advertising campaign the Hammermill Paper Company has carried on and expects to continue will put their product not only in every office in the country but in the school rooms and the home libraries as well.

The Conference began on Tuesday, August 23, 1921, with a meeting of the Advisory Committee. Luncheon was had at the home of President Behrend, and after the business of the afternoon, dinner was served at the Kahkwa Club. On Wednesday the agents arrived from all sections of the country and a reception was held at eleven o'clock followed by a luncheon. The first meeting was held during the afternoon in the Ball Room of the Kahkwa Park Inn. Many of the guests were accommodated with sleeping quarters at the Inn and this arrangement made it comfortable and convenient to attend the meetings without having to ride all the way from the hotel, downtown, each morning.

On Thursday, meetings were held both in the morning and afternoon. Election of the Advisory Committee for the ensuing year resulted as follows: W. F. McQuillan, The A. Storrs-Bement Co., Boston, re-elected chairman; John Leslie, The John Leslie Paper Co., Minneapolis; John D. Swigart, Swigart Paper Company, Chicago; *Ross Andrews, R. P. Andrews Paper Co., Washington, D. C.; E. A. Petrequin, Petrequin Paper Company, Cleveland; A. B. Sherrill, Riegel & Co., Philadelphia; *Spencer Lathrop, Lasher & Lathrop, New York City; *J. A. Carpenter, Carpenter Paper Co., Kansas City, Mo.; Louis A. Colton, Zellerbach Paper Co., San Francisco. *Re-elected.

The big annual dinner was served in the main dining hall of the Inn at seven o'clock on Thursday evening. Each year this event is a great occasion for felicitation and display of good-fellowship. An orchestra and a male vocal trio furnished delightful music. President Behrend performed the office of toastmaster and in his usual cordial and graceful manner introduced a number of men prominent in the conference.

"The business part of our Tenth Annual Conference is over," said Mr. Behrend. "We feel that it has been a good gathering, from the business standpoint, and we thank you agents for your interest and co-operation. To us it is the most important event of the year. We try to appear before you with the feeling that we can look you in the eye. The paper trade of the country looks to these conventions as of importance to the industry as a whole.

"We meet here to promote our mutual interests," continued Mr. Behrend. "That means the making of money, to be sure, but the making of money is but one part of our purpose. We are national advertisers of Hammermill products, and national advertising imposes upon the manufacturer and those who are associated with him in the distribution of his product a very solemn obligation. The manufacturer must make his policy right and his goods reliable; he must raise his own standard continually. The morale of his organization benefits by the obligation that is upon it.

"We get inspiration and suggestions from these meetings, and we realize that the making of money by all of us is but the means to an end. Whether he be merchant, manufacturer, musician, student, or what not, every man seeks ultimate contentment. Some seek it through work, some through applause, recognition, money, fame, or position. And at the basis of contentment is one big principle, without which contentment cannot be achieved. That principle is the possession of a good name."

Among those who were called upon to make talks were W. F. McQuillan, chairman of the Advisory Committee, Ross P. Andrews of Washington, D. C., John Leslie of Minneapolis, Minn., Sales Manager Wm. S. Epply and Vice-President Norman W. Wilson. The Old Guard, consisting of members who have attended at least five consecutive meetings were grouped together at one table.

At the conclusion of the dinner the Program Committee provided a "Twilight Party for those who care for that sort of thing." Needless to say this was a hilarious success, due to the genius of C. Washington Chabot, Leo Joy, Charles Milner, Ellis Frampton and many others of the Hammermill staff.

The following days was given over entirely to an outing at the beautiful Kahkwa Club, where many played golf while others divided their attention between trap shooting, quoits and either watching or playing in the baseball game between teams selected from the East and West. In the latter the Western team easily won by the score of 32 to 2. Much amusement was exhibited over the usual pipe race which was won by D. W. Magown, Western Newspaper Union, New York City. In the evening a banquet was given and prizes were awarded to the successful contestants in the day's games.

The manufacture of wood pulp is a growing industry in Japan, says the American Forestry Magazine. She now has thirty wood-pulp mills and produces annually 280,000 tons of chemical and mechanical pulp. The consumption of pulp wood is about 400,000 cords a year. Spruce and fir are mostly used as pulp woods and are grown in Hokkaido and Sakhalin, the northern islands of Japan.

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CORDUROY CLOTH

for SAVEALLS
GROUND WOOD WET MACHINES
WATER FILTERS
SULPHITE WET MACHINES

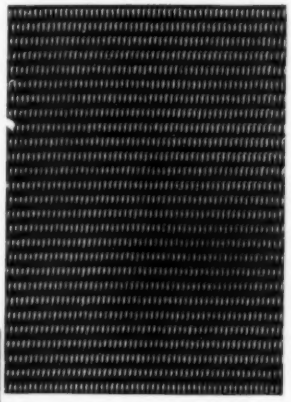
Tyler Corduroy Cloth, for use in the paper making industry, has four distinct advantages over other types of screen, namely:

1—It eliminates the necessity of using backing wires.
2—it gives much longer life than fine face wire.
3—There is no chance for stock to collect between the two covers which occurs where a fine wire and a backing wire are used.
4—Eliminating the backing wire, saves considerable time in applying the cloth to the machine.

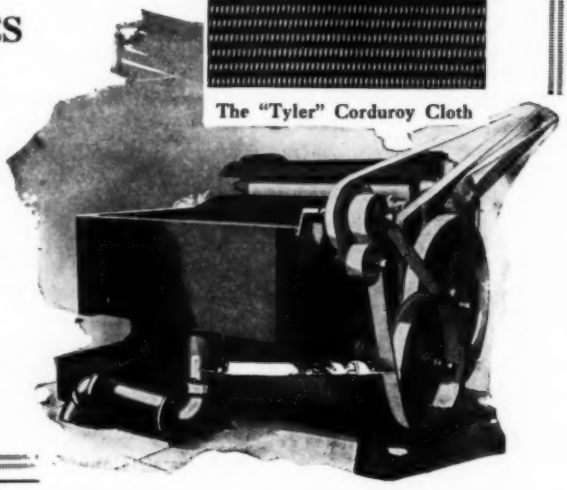
Tyler Corduroy Cloth is made from phosphor bronze, monel, or nickel wire, and is carried in stock in all widths up to and including 150 inches.

Samples will be sent upon request.

Also Manufacture Fourdrinier Wires, Cylinder Faces, Washer Wires, Backing Wires



The "Tyler" Corduroy Cloth



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CLEVELAND, OHIO

"MICHIGAN" Combination Steel and Wood Pipe

LONG DISTANCE CONVEYOR OF WATER AND PAPER STOCK IN PAPER AND PULP MILLS—Specially Adapted to Carry Sulphite, Ground Wood and "White Water"

Eighteen reasons why you should use "Michigan" combination steel and wood pipe

1—Durability of Wood Shell. 2—Sanitary. 3—20% more capacity than Cast Iron Pipe. 4—Simplicity in handling. 5—Light in weight. 6—Speed in laying. 7—Protects against freezing. 8—Not affected by Electrolysis. 9—Rigid inspection of materials. 10—Efficient construction of stave. 11—Strength of steel banding. 12—Protection of banding with asphalt coating. 13—Cannot burst under pressure. 14—Can be laid in a wet trench. 15—Short curves without specials. 16—Low installation and maintenance cost. 17—Responsibility of company. 18—Not affected by sulphur or chemical solutions.

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"Steel for Strength—Wood for Durability"

Why Sell Below Cost?

THOMAS J. BURKE, Secretary-treasurer of the Cost Association of the Paper Industry, has recently submitted the following:

"Undoubtedly some manufacturers today are selling their products below cost. Bearing this in mind, I recently requested Dr. Baker to obtain from Mr. Wise an opinion as to whether it is legal for members of a trade association to analyze in their meetings the final cost of their products. Mr. Wise replied as follows:

"'I have your letter of the 1st instant in which you ask the broad question whether it would be legal for the members of a trade association to analyze in their meetings the cost of their product. My answer to this inquiry is that, in my opinion, there is no legal prohibition against such a discussion. But it must be borne in mind that this answer applies merely to the question as stated. I take the position that there is no statute law that forbids competitors disclosing every fact pertaining to their business.

"'It must be borne in mind, however, that if underlying such disclosures there is a purpose, express or implied, on the part of those to whom such information is given, to adopt and pursue any particular course, this may result in illegality, and the queston of whether or not there is such purpose, express or implied, may be spelled out from the course of conduct of those contributing such information, and therein lies the danger.

"'It would, of course, be entirely improper for a set of manufacturers to discuss and agree upon the percentage of profit that they would add to their manufacturing costs, and if the members of any association should pursue such course they would be liable to prosecution and should be prosecuted. If, after disclosure of individual manufacturing costs, it should appear that those participating in such disclosure adopted a general average of these manufacturing costs upon which to predicate their respective sales prices, this would indicate a concert of action which would invite prosecution.'

"I sent copies of this letter to the members of the Cost Association accompanied with a letter suggesting that meetings should be held of the different groups of manufacturers, such as the writing, book, wrapping, etc., for the purpose of comparing their total production costs, or at least the methods employed in arriving at these costs. I further suggested that each group might select that product which may be said to be the one most commonly manufactured within their group, and confine themselves to the cost of that one product.

"Shortly after this, I received from Mr. Nelson B. Gaskill, Acting Chairman of the Federal Trade Commission, a copy of a letter which had been sent by that commission to the Millwork Cost Bureau, in which the following paragraphs occurred:

"'1. One of the most valuable functions of a **trade association is education in proper methods of cost accounting**, so that the member may know his costs as accurately as possible and compete with knowledge of his own business.

"'2. If you do not publish a uniform cost list, nor endeavor to educate your members to the use of a **standard cost**, you will so far as this subject is concerned, be with the law.'

"I have had a good deal of correspondence with Mr. Gaskill and am quite conversant with the stand which the Federal Trade Commission is taking towards trade association activities in cost matters and I can absolutely assure manufacturers in the paper and pulp industry, that as far as this association is concerned, our proposed activities are absolutely legal and well within the law.

"I have received from the presidents of a number of well known companies assurance that they will be very willing to have their companies represented at any meetings which this association might hold along the lines indicated in my letter. These manufacturers represent the following groups: Waxed paper, wrapping paper, book, cover, tissue, toilet paper converters, writing and blotting paper."

Mr. Hutchinson Resigns

"It was with very great regret that the President, Mr. S. L. Bush, received from Mr. B. E. Hutchinson, Treasurer of the American Writing Paper Company, and First Vice-President of this association, his resignation from the association. Mr. Hutchinson has recently resigned his position with the American Writing Paper Company in order to take up another position with the Chalmers Motor Car Company of Detroit. He will be very much missed by his colleagues on the Executive Committee of this association, as well as by his many Holyoke friends. It is especially regrettable at this time that he should have to leave us, since there never was a time when it was so necessary to place squarely before the pulp and paper industry in general the value and importance of good cost accounting. Mr. Hutchinson has done a great deal more than his share in this respect and will be very much missed in the Cost Association's activities. We wish him the best of success in his new position."

Fall Meetings

The Fall Conference of the American Paper and Pulp Association will hold its Fall Meeting in Chicago.

The banquet or luncheon will be held on Thursday, November 3rd. During the same week the National Paper Trade Association will hold its Fall Meeting in Chicago.

As announced in the last issue, the joint meetings of the Technical Association of the Paper Industry and the American Pulp and Paper Mill Superintendents' Association will be held at Washington and Philadelphia on October 18 to 21. The complete program of this meeting was published in the last issue.

Committee on Beater Furnish

It was with much regret that the Secretary-Treasurer of the Cost Association of the Paper Industry recently received notice of the resignation of Mr. C. A. Jones of the American Writing Paper Company from the chairmanship of this committee, Mr. Jones having severed his connection with the American Writing Paper Company. He is going to join Mr. Durward E. Burchell in carrying on the work at the School of Industrial Accounting, Harvard University. Mr. Burchell is to be congratulated on having secured a very capable assistant and one who is popular wherever he goes. Mr. Jones has been in Holyoke for the last two years and will be very much missed by his many friends there. We wish him the best of success in his new position.

Mr. Henry W. Miller, also of the American Writing Paper Company, has kindly consented to step into the position vacated by Mr. Jones, so that the work of this important committee will not in any way be held up. Fortunately, Mr. Miller has attended one or two of the meetings held by the chairmen with Mr. F. C. Clark assisting, and is very familiar with the work which the committee is attempting to do.

A joint report is now being drawn up by the two chairmen and it is hoped that this will be in the hands of the other members of the committee in the course of the next few days. These gentlemen are as follows:

Cost Association appointees:

Chairman, Henry W. Miller, American Writing Paper Co.;

Perforated Metal Screens

in all metals for pulp and paper mills

Elevator Buckets (Plain and Perforated)

Conveyor Flights and Trough

General Sheet and Light Structural Work

Write for perforated metal handbook

Hendrick Mfg. Company

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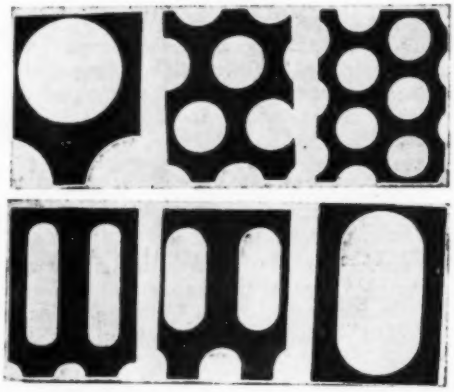
51 Dundaff Street
Carbondale, Penna.

30 Church Street
New York City

915-916 Union Bank Building
Pittsburgh, Penna.

Perforated Metal Screens



Of Copper, Brass, Steel, Bronze, or Any Other Metal

Perforations of All Sizes and Shapes for Use in Pulp and Paper Mills in

Centrifugal Screens, Drainer-Bottoms, Filter Plates, Pulp Washers, Suction Box Covers, Etc.

Accuracy in all details and excellence of quality at lowest consistent prices

The Harrington & King Perforating Co.

615 North Union Avenue CHICAGO, ILLINOIS, U. S. A

NEW YORK OFFICE, 114 LIBERTY STREET

LISBON PULPSTONES

Quantity Unlimited Quality Unsurpassed
Guaranteed to Give Satisfaction

A free cutting Pulpstone that will produce more Pulp and withstand speed and pressure.

Magazine Grinder Stones in All Sizes

Samples and Quotations on request

The Smallwood-Low Stone Co.

World's Largest Producers of Pulpstone

LISBON, OHIO, U. S. A.

J. Howard Cooney, Peninsular Paper Co.; J. B. Hipwell, Dill & Collins Co.; W. W. Howe, Z. & W. M. Crane; A. J. Moyer, Z. & W. M. Crane; W. L. Fink, Barrett Co.; E. J. Fitzgerald, Scott Paper Co.; J. E. Hyde, S. D. Warren Co.; H. C. Bradford, King Paper Co.; D. A. Smith, District of Columbia Paper Mfg. Co.; H. A. Castle, Racquette River Paper Co.; E. G. Clerke, Richardson Co.

Technical Association appointees:

Chairman, J. C. Sanburn, Strathmore Paper Co.; Frederick C. Clark, American Writing Paper Co.; Robert Holz, Richardson Co.; Frederick A. Curtis, Bureau of Standards; Elbert G. Milham, Bryant Paper Co.; C. Frank Sammel, Crane & Co.; F. B. Libby, Kalamazoo Vegetable Parchment Co.

It will be noted that practically every branch of the industry is represented on the committee, also that its members are located in practically every important paper center. These gentlemen are earnestly requested to deal as promptly as possible with the various points raised by the chairmen in their report and to reply thereto at their earliest possible convenience. By doing so, they will know that they will be assisting the chairmen in their endeavors to have the report of this committee ready for the convention to be held by this association in Chicago on October 6th and 7th, next.

Operations Being Resumed in High Grade Mills

Resumption of operations by some of the high grade paper mills on a broad scale is reported to the American Paper and Pulp Association, these reports coming from various sections of the country. Among the notable examples are the Strathmore Paper Company at Mittineague, Mass., which will restore its machines to production on September 1st, and the American Writing Paper Company, which is steadily increasing its output now that the low point has been reached.

Following the recent and various individual downward revisions in the price of high grade paper, liquidation is apparently complete in the writing, book and cover paper markets, and as a result buying is increasing.

While these prices may not have returned to their pre-war level, they are down to bed rock so far as costs are concerned. With contract bleached sulphite selling at 4¼c and other pulps down in relative values, with rags only 30 per cent higher than 1913 prices, with wages reduced to the lowest possible minimum and with coal still high, the mills are faced with fixed costs for a number of months and have gone the limit in the reduction of prices. Furthermore, these prices contemplate increased production, because at the present low rate of operation they represent in many lines a distinct loss.

In comparison with costs, high grade papers have liquidated more in their prices than shoes, finished cotton goods and textiles, the factories of which are in operation with good demand since the public feels these prices to be on a satisfactory level. High grade papers, having gone to and below this level, are now also increasing in use with the return of confidence on the part of the merchants, printers and public.

The Need for Newsprint

More than 11,225,000,000 copies of daily newspapers are printed annually in the United States, averaging one copy a day for every three and one-fifth persons of the country's total population, latest statistics of the bureau of the census show.

Circulation of the nation's 2,433 daily newspapers aggregated 32,735,937 copies a day, an increase of 13.8 per cent in the five years. The circulation of the 592 Sunday newspapers was 19,929,834 copies each Sunday during 1919, an increase of 14.9 per cent.

The aggregate circulation of these daily and Sunday newspapers, therefore, was 11,270,559,316 copies, or 106.6 copies per capita for the year.

Total circulation of the country's 20,431 newspapers and periodicals aggregated 15,475,145,102 copies for the year, an increase of 7 per cent per issue in five years. That includes daily, Sunday, triweekly, semiweekly, weekly, quarterly and all other newspapers and periodicals.

The printing and publishing industry's products were valued in 1919 at $1,528,856,503, of which newspapers and periodicals contributed $808,066,035, and newspapers alone $612,718,515, an increase of 116 per cent in five years. Newspaper subscriptions and sales aggregated $204,952,214, an increase of 105.9 per cent. Advertising totaled $407,760,301, an increase of 121.5 per cent.

Turning Out Trained Woodsmen

The New York State Ranger School, operated under the auspices of the college, was opened at Wanakena in the Adirondacks in 1914. Since that time about 175 men have been graduated who have gone into all phases of practical woods work. Unless all signs fail, the forest owner and timber land operator of the future will require a far better grade of man to supervise his operations than in the past. Any roustabout is trusted to look after a hundred dollar horse. A "Man-of-War" and "Sweet-Briar" have the best veterinarians and experts that money will propcure. It is the same way with forest land. Twenty-five years ago, 63,000 acres of virgin spruce and hardwood land in the Adirondacks were purchased for about $1.35 per acre. Within the past year three pieces of "cut-over" land from which the first growth of spruce and balsam had been removed were sold at a price approximating $40 per acre. The day of the $10,000 horse is here in forestry circles and we believe the forward-looking forest operator needs someone who can not only fight but **prevent** fires, who can reforest areas that have already burned, who can nip insect attacks in the bud, who knows something about close utilization, the per cent of loss in lost steps and large tops, etc. The school at Wanakena turns out this type of man.

Such an apprentice to the woods game, plus a year or two of experience in woods under an old woodsman, should be a mighty valuable man to any large operating concern which desires to make the most of its forest property in the long run.

Paper Tape Keeps Fruit Fresh

That gummed paper tape can be used to preserve perishable fruits and thereby greatly add to the palatability as well as to the keeping qualities of fruit, was disclosed at a meeting of the Gummed Paper Manufacturers at Atlantic City, during the convention of the National Association of Corrugated Fibre Box Manufacturers, when J. W. Webb, inspection engineer for the Container Club of Chicago, told of experiments in car lot shipments.

He said that the packing of melons, apples, peaches, citrus and other fruits in corrugated fibre boxes, with gummed tape used to hermetically seal the containers, added surprisingly to the length of time in which the fruit could be kept fresh.

He gave various instances of the experiments made, and said that the time element varied according to the species of fruit being shipped. He urged the gummed paper manufacturers to note this opening for additional business.

The Gummed Paper Manufacturers' Association decided to continue its present organization, and elected W. R. Lusignea of Samuel Jones & Co., Newark, N. J., Vice-President. Phillips Kimball of the Liberty Paper Company of New York was named as a committee of one to discuss with the Container Club the standardization of gummed tape.

The association agreed on a set of trade customs and a committee was named to formulate a uniform sales contract.

The Texas Gulf Sulphur Company announces the removal of its New York offices to 41 East Forty-second street.

RETURN TUBULAR LOCOMOTIVE BOILERS WATER TUBE SCOTCH MARINE

A LARGE STOCK OF HIGH-GRADE BOILERS OF PRACTICALLY ALL SIZES, TYPES AND MAKES, TAKEN OVER FROM DU PONT CHEMICAL COMPANY'S AND OTHER PLANTS WITH PRODUCTION RECORDS — RECONDITIONED, OFFERED SUBJECT TO ANY INSPECTION, AVAILABLE NOW!

"SAVE TIME AND MONEY ON YOUR POWER INSTALLATION — LET **DAVIS** FURNISH THE BOILERS"

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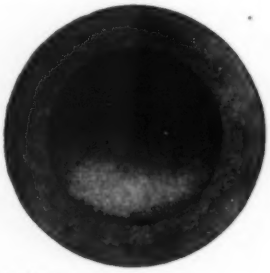
Guaranteed Perfect

Draper Hollow Balanced Brass Balls

FOR STUFF PUMPS

Absolutely balanced; will not pound out of shape

Specify these when ordering new pumps.



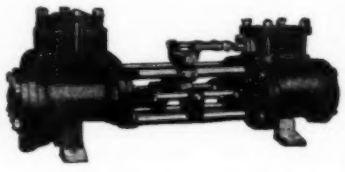
Order these to replace worn-out balls.

We also manufacture—
SOLID BRASS BALLS
IRON AND STEEL BALLS
BALL CHECK VALVES
VALVE FACING TOOLS

The Draper Manufacturing Co.

Port Huron, Mich. Petrolea, Canada

Every ball bears our registered trade-mark



Dean Bros. Durable Duplex Steam Pump Will Not Short Stroke

The steam cylinders on the Durable Duplex Pumps have half as many ports as are found on the old fashioned duplex pump. Single ports are made possible by the use of Dean Bros. patented Durable valve movement. This method of construction produces a very noticeable economy in steam consumption and is only one of the many advantages which have placed these pumps far ahead of any other duplex steam pump now manufactured.

Send For Catalog No. 127

New York Sales Office, 141 Broadway

DEAN BROS. STEAM PUMP WORKS. INDIANAPOLIS.

WYCKOFF WOOD PIPE

PRESSURE PIPE THAT NEVER BURSTS.
Built in sizes 1 inch to 48 inches.

The Paper Industry is successfully using thousands of feet of this Pipe and they find it to be the best conveyance for Paper Stock and Acids that can be obtained.

The Pipe of Service

DURABLE—ECONOMICAL—EASY TO INSTALL

Built of selected Canadian White Pine, Wyckoff Wood Pipe is wound with **steel bands whose tensile strength is 58,000 to 65,000 lbs. per square inch.** The experienced engineer selects a pipe of proven dependability. Wyckoff Wood Pipe, during the past 65 years, has built a reputation that stands the keenest competition. It has been, during this time, the choice of the largest pipe users in the world. We also manufacture a high grade underground steam pipe casing.

Write today for catalog and prices

A. Wyckoff & Son Company

1855 Elmira, N. Y., U. S. A. 1920

Siam Will Set Up Trial Paper Mill

Siam will soon have an experimental paper mill made in America with equipment recommended by the Bureau of Standards of the Department of Commerce.

The mill is about 50 per cent larger than the one at the Bureau of Standards and is capable of producing 1,200 pounds of paper daily.

Siam is interested in paper making because of the possibilities of turning some of her grasses, weeds and other fibrous plant products into paper. The paper mill will be used in making researches which will aid in the development of a Siamese paper industry.

America is also sending to Siam with the mill a trained paper maker and engineer, who will superintendent the erection and operation of the mill.

Canadian Newsprint Price Cut

The price of newsprint in Canada for the last quarter of the year will be 4c per pound, or $80 per ton. The export price is unsettled, and will be governed by trade conditions in the United States. The price in Canada has hitherto been governed by the export price. The new rate is down $15 per ton from the current rate.

It is stated that Canadian newsprint manufacturers who have been in session in Montreal have discussed curtailment of production owing to the shrinkage in consumption in the United States.

British Columbian Pulp Industry Grows Rapidly

Starting in 1911 with an output of ninety tons, the chemical pulp industry in British Columbia has increased year by year until in 1920 the output reached 108,670 tons. The first year in which mechanical pulp was manufactured in the province was 1917, in which 65,000 tons were turned out. In 1920 this had increased to 108,000 tons.

In 1913 the output of paper was 45,816 tons. This increased to 146,500 tons in 1920. The value of pulp and paper production in 1920 in British Columbia was $21,500,000, making it one of the most important industries in the province.

Mattagami Pulp & Paper Co., Ltd., has been placed in the hands of G. T. Clarkson, who has been appointed receiver for the concern. The treasurer issued a statement to stockholders in which it was stated the company had incurred trade liabilities in the regular course of business which it is impossible to liquidate owing to existing trade conditions. In justice to holders of bonds and debenture stock it was decided best to place the property in the hands of a receiver who will conduct the business until conditions improve.

The Nominating Committee of the National Association of Purchasing Agents named only one slate for re-election at their annual meeting and convention to be held in the Claypool Hotel at Indianapolis, October 10th to 13th, where it is expected that 2,000 delegates will be present representing all of the associations. The slate includes the entire board as it now stands.

Wage reductions of 10 per cent, for skilled workers and 25 per cent for common laborers have been decided upon by the Board of Arbitration, which was appointed last June to adjudicate the differences between the paper mill owners in the United States and Canada and their employes, who struck rather than accept a 30 per cent reduction.

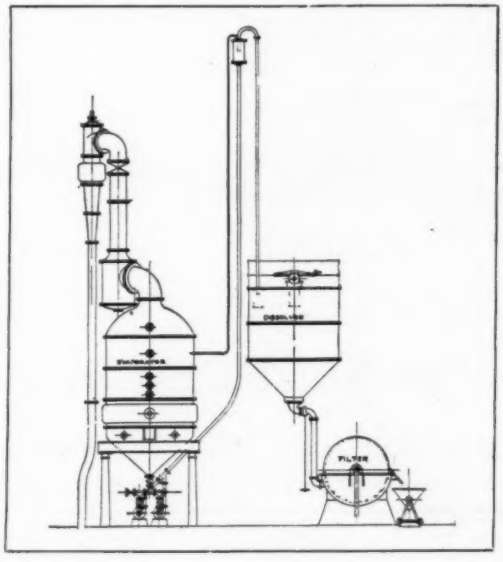
Senator W. C. and G. C. Edwards, who sold their large timber holdings on the Gatineau River in Canada to the Riordan interests, are forming a new company, capitalized at $1,500,000, under the title of the Edwards Pulp and Paper Company, Ltd., and will also manufacture lumber as well.

Apparatus for Continuous Removal, Filtering and Washing of Precipitated Salts from Evaporators

Particularly desirable for use in connection with diaphram cells

THIS apparatus, backed by a number of years of successful service, is intended to make what is now generally an intermittent operation continuous, and in a large sense automatic. Moreover, the apparatus is of a character requiring no more attention than can be given it by the man in charge of the evaporator. In other words, it can be operated without extra labor.

One of the most important features is that it permits continuous operation of evaporators

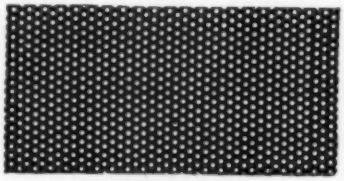


without periodic drawing off and refilling, consequently it contributes to minimum steam consumption by doing away with the intermittent cooling and reheating of batch charges as drawn into the evaporators.

Glamorgan Pipe & Foundry Co.

Lynchburg, Va., U. S. A.

Perforated Metal Screens for Pulp and Paper Mills



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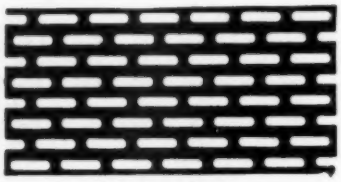
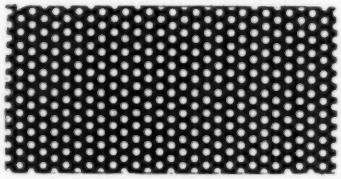


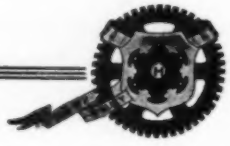
⅛ x ½" Slots



3/32 inch round

Steel, Copper, Brass, Bronze and other alloys punched for Centrifugal and Rotary Screens, Pulp Washers, Drainer Bottoms, Filter Plates, etc.

CHARLES MUNDT & SONS 57-65 Fairmount Avenue, Jersey City, N. J.



From "A" to "Z"

You know your business from "A" to "Z" and we know trans nission engineering—at least we should—as we have been at it for thirty-seven years.

Combining your knowledge with ours, when a power transmission machinery equipment is to be laid out, or a friction clutch is to be installed, will insure the correct solution and a perfect installation.

Have your power transmission problems solved by our engineers. Their service is absolutely free and places you under no obligations.

Complete American or English System Rope Drives

We manufacture a complete line of efficient power transmission machinery, including the well known Hill Friction Clutch (Smith Type) and Hill Collar Oiling Bearing. Catalog and bulletins upon request.

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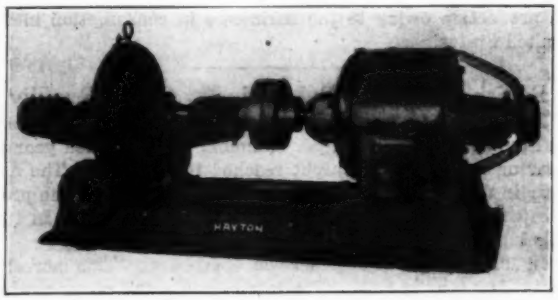
Hayton Centrifugal Pumps

SAVE POWER and MONEY

BY USING



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"With us it is an engineering problem"

Designed especially to meet the requirements of pulp and paper mills. We do not build a pump after OUR ideas and then try to sell it to you. We make a study of YOUR peculiar problems, and then build a pump to suit your needs. Hayton Pumps are built for hard, continuous operation, and will stand up under the most severe usage. We guarantee the highest efficiency, and maximum economy in power consumption.

We also build a full line of Sandusky Triplex pumps.

Let us have your specifications for quotations

Hayton Pump & Blower Co.

Manufacturers

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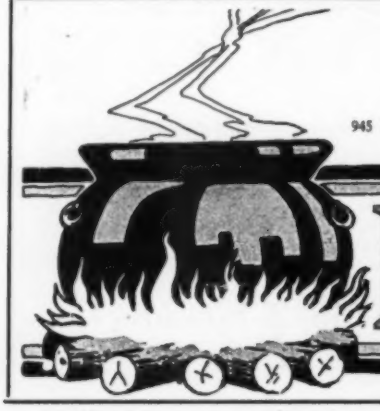

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SWENSON EVAPORATORS

Truth About Costs and A. W. P. Co.

In view of the many rumors which have been circulating lately to the effect that the American Writing Paper Company was giving up its cost department, etc., President Galliver was interviewed with a view to obtaining from him the exact truth regarding these rumors.

Mr. Galliver has informed us that the American Writing Paper Company had not the slightest intention of giving up its cost department or in any way giving up its interest in promoting the advancement of sound cost accounting principles throughout the pulp and paper industry. He stated that although his company had reduced their staff by about 150 employes, it was necessary to bear in mind that this covered twenty-six mills and, therefore, only represented an average of about five employes per mill. He pointed out that of the 150 dismissals, not more than about 25 per cent were connected with the cost and statistical departments, so that the rumors which have been circulating quite freely could fairly be stated to be untrue.

The mills of the International Paper Company in the Black River Valley will probably not be opened for six months to come, according to a statement from Manager Curtis of the New York office. Mr. Curtis was asked whether the company contemplated the permanent closing of the local mills. He said that the local mills were rather expensive to operate and that they certainly would not be reopened until business conditions change for the better.

Plans are nearing completion for the proposed new paper mill, to be erected by the Gwynns Falls Paper Company, 517 Calvert Building, Baltimore, on property recently acquired at Gwynns Falls, and bids will soon be asked. The main mill will be one, two and three stories, 75x400 feet, estimated to cost about $250,000 with machinery. Joseph H. Wallace, New York, is engineer.

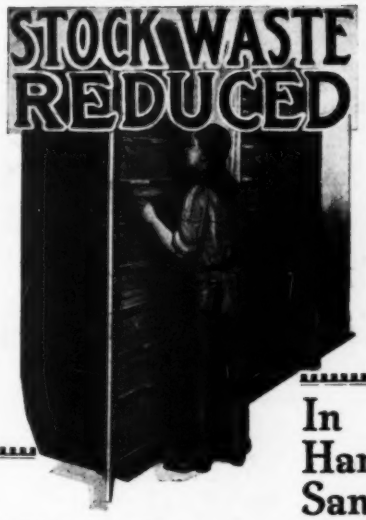
The International Paper Company, over the last six years, has earned $144 a share for the common stock and paid out nothing in dividends. It has added $15,400,400 to its working capital and paid off $4,000,000 of bonds, a total of $19,400,400, equal to nearly $100 a share on the common stock or $56 a share in excess of the present selling price.

Five men were killed and a sixth injured, probably fatally, by the explosion recently of a battery of three high pressure boilers in the plant of the West Virginia Pulp and Paper Company at Mechanicsville, N. Y. The force of the explosion, the origin of which is not known, tore the roof off the building and hurled it into the Hudson river, 100 feet away.

By the action of the Howland Pulp & Paper Company stockholders, Howland, Me., the name of the corporation has been changed to the Advance Bag & Paper Company, Inc., and the capital stock has been increased from $2,000,000 to $3,000,000, divided into 20,000 shares of common and 10,000 shares of 7 per cent cumulative preferred, at par value of $100.

The largest order for paper placed in New York city for several months was booked recently by a Boston paper jobbing house, the Denison-Pratt Paper Company, of 158 Devonshire street. The stock contracted for is to be used in printing the New York city telephone directory and aggregates 10,500 tons.

Extensive repairs have been made at the plants of the Strathmore Paper Co., at Mittineague and Woronoco, Mass., during which time the plants have been closed.



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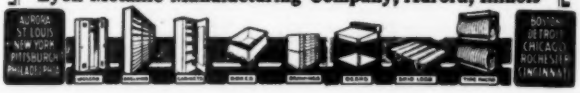
LYON STEEL SHELVING equipped with doors is ideal for your sample stock. Shelves adjustable on 1½ inch centers give any size compartments. Doors exclude dust and prevent damage. Samples are quickly accessible. The shelving will pay for itself in paper and time saved.

Write our nearest branch about your requirements.
We will gladly suggest the equipment you need.

Lyon Metallic Manufacturing Company, Aurora, Illinois



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New Safety Device

for your PAPER MACHINE REELS?

The Object Is—TO AVOID DRAGGING MEN AND CLOTHING IN BETWEEN REELS

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We Solicit Your Inquiries Nekoosa, Wisconsin

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WE ALSO MANUFACTURE

Valves, Unions, Cocks, Fittings, Digester Parts, Castings, etc., for Sulphite Mills from Our Perfection Bronze

Largest producers in the world of highest grade Brimstone —guaranteed 99½% pure—free of Arsenic and Selenium.

The UNION SULPHUR COMPANY

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EXCLUSIVE MAKERS OF

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Get Authentic Information
Ask the Men Who Run Them

Yours for service

LOCKPORT FELT CO., Newfane, N. Y.

New Sand Filter

A SPECIAL filter for paper mills, producing all the results the paper manufacturer desires. It is a modification of the well known Hungerford filter adapted to paper mill use. It is constructed of concrete, strictly wrought iron pipe, brass strainers and especially prepared silica sand. It is as durable and efficient as can be built at any cost. It can be sold at a very low figure.

This filter gives perfectly clear water, washes thoroughly, does not require renewal of the sand bed, is absolutely reliable in the performance of its duty and requires a minimum amount of attention.

Send for full particulars

Hungerford & Terry, Inc.
PHILADELPHIA, PA.

Talk of Another Mill at Kalamazoo

A company with an authorized capital of $200,000 will soon be organized in Kalamazoo, it is stated, to engage in the reclamation of ground wood and sulphite from newspaper and higher grade paper. A site is now in view and it is the intention to erect the first unit this fall. The initial production will be from 40 to 50 tons daily or 12,000 to 15,000 tons annually.

Peter V. King is the moving spirit behind the new enterprise and the process to be employed was worked out by himself. Investigation shows that it is patentable and patents are to be applied for immediately. By the methods employed, declared by Mr. King to be simple and fool proof, a good quality of pulp can be produced that can be sold profitably at a price directly in competition with mechanical ground wood.

Reopen Old Paper Mill to Handle Waste

Using only waste paper as raw material, a new Denver company to be known as the Colorado Paper Products Company, will start manufacturing tissue napkins, wrapping paper and flat news print paper within three months, it is reported. W. H. Carter, D. H. Greene and F. M. Gill, organizers of the new concern, have purchased the main central building of the old Platte River Paper Mill Company of that city. Mr. Gill estimates the Denver waste paper supply at from twenty to thirty tons a day. Eventually, the company plans to take over the entire Platte River plant.

With two timber sales already affected—one involving two billion feet and the other more than a million cords—the pulp and paper development of Alaska will soon be inaugurated on a large scale by the construction of two big pulp mills and paper plants, in addition to a vast hydro-electric development.

This was the assurance given by E. A. Sherman of Washington, D. C., associate forester, to Local Supervisor W. G. Weigle.

Wisconsin Mill Strike Ends

The strike at the Rhinelander Paper Company plant, Rhinelander, Wis., which employs 500 men, has been settled through the efforts of the Wisconsin Industrial Commission. The wage scale will be the same as offered the strikers May 1. The company at the time of the strike employed 300 men, and expects to return to a normal basis this month.

The paper mills at Powell River, B. C., are producing approximately 225 tons of paper per day, with a revenue of about $7,000,000 annually. Most of the paper is sold in Vancouver, Portland, Los Angeles and Prince Rupert. The raw material for the paper is rafted here from the Queen Charlotte Islands, 300 miles away.

Directors of the Oregon Pulp & Paper company, at a meeting at Salem, Ore., voted to build a dam across Mill creek, erect a modern power house and provide transmission lines to the main paper plant at a cost exceeding $100,000. Electricity will be generated at the new power house and carried to the paper plant for auxiliary power.

The world's progress in education is reflected everywhere in an increase in the consumption of printing paper; for example, Siam imported in 1920 13,200,000 kilos of unprinted paper, 117,000 kilos being received from the United States. The increase in consumption in the period of six years prior to 1920 was 500 per cent.

Reports from the paper mill sections of northwestern New York indicate a considerable improvement in orders, and the outlook is becoming much brighter.

BROWNHOIST

Increased handling capacity at one-half the cost

To double your handling capacity and at the same time cut the unit cost in half is certainly worth while. The Brownhoist locomotive crane shown above is doing this at the paper mills where it is working. This crane handles 85 thousand feet of timber per day at a cost of 70 cents per thousand. This is against 45 thousand feet at a cost of $1.48 per thousand under the former method.

In addition to the speed and low cost of upkeep of Brownhoist cranes their great flexibility should be considered. Practically all kinds of materials can be handled anywhere as Brownhoists are made to operate on traction wheels or creeper trucks as well as railroad trucks. And the saving of handling materials by locomotive crane is usually as great or greater than the above.

Catalog K shows many types of Brownhoist cranes working in different industries. If you have any handling problems you will be interested in seeing how some Brownhoist owners are solving theirs. Write us. The knowledge of 40 years of crane building is at your service.

The
Brown Hoisting Machinery Co.
CLEVELAND, OHIO, U. S. A.

Engineers and Manufacturers of Heavy Dock Machinery, Bridge Cranes, etc., as well as smaller Cranes and Hoists

Branch Offices in New York, Pittsburgh, Chicago, San Francisco and New Orleans

Smith Hydraulic Turbines

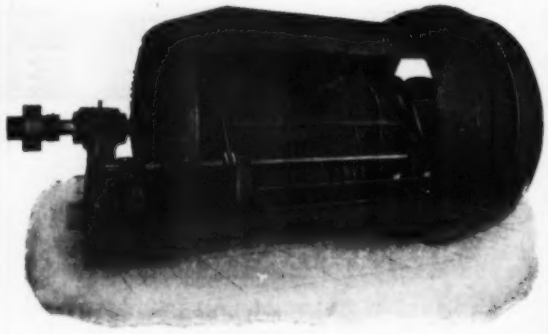


Illustration shows horizontal unit developing 2,400 horsepower under 42 feet head, at

88% EFFICIENCY

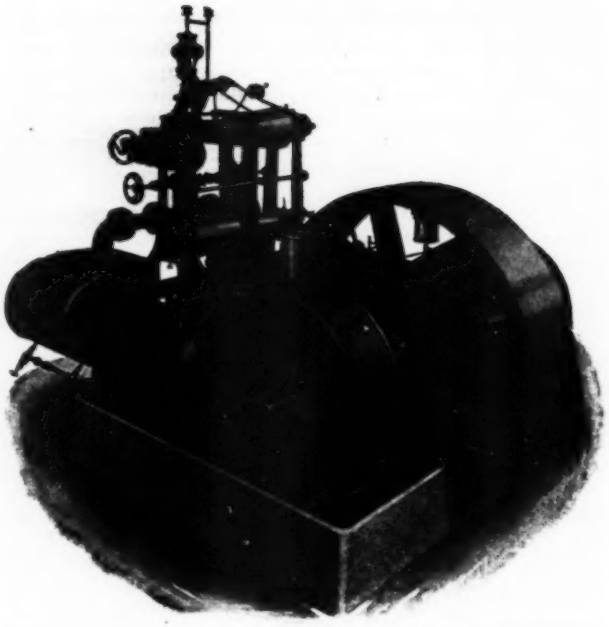
installed at Glens Falls, N. Y., Mill of International Paper Co.

Write Dept. "S" for Illustrated Bulletin

S. MORGAN SMITH CO., York, Pa.

Branch Offices:

BOSTON 176 Federal St. | CHICAGO 76 W. Monroe St. | MONTREAL 405 Power Bldg.



Variable Speed Engine

The engine illustrated above is especially designed to drive paper machines, giving continuous and reliable service. A patented safety device protects your employees and plant.

THE BROWNELL CO., Dayton, Ohio

SEND FOR BULLETIN E-4

KNOW WHAT YOUR COAL BILL SHOULD BE

There's no longer any such commodity as "Cheap Coal," and indications are that there probably never will be again. At present prices, or for that matter—at *any price*—it is neither good engineering practice nor good management to check your coal by mine weights or railroad weights.

RELIANCE WEIGHING MACHINES

insure an *accurate* and *positive* check on every ounce of coal consumed. They provide a means, without additional labor cost, of checking the total received against the total purchased. They show to operator and executive the exact amount of coal consumed by each boiler. They bring efficiency and economy into coal consumption.

Weighs—records—indicates—without manual effort—the entire operation automatic.

Each machine is a unit in itself, so perfect in design and flexible in application that it will meet any existing plant conditions.

The services of our engineers are at your command in helping you plan prospective installations.

Write us for details.

RELIANCE WEIGHING MACHINE CO.

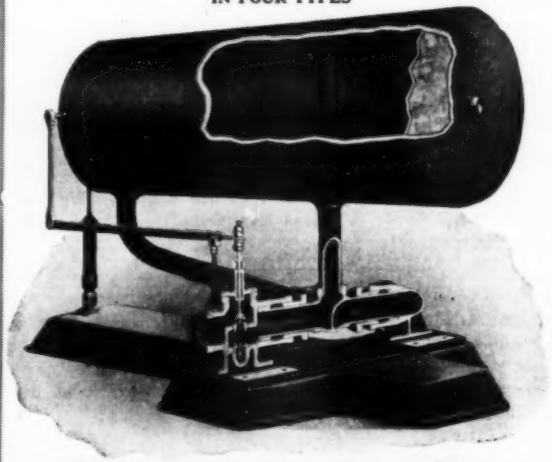
General Offices and Factory

LUDINGTON, MICHIGAN

Representatives in principal cities United States and Canada

The ELLIS AUTOMATIC TILTING STEAM TRAP

IN FOUR TYPES



Vacuum Traps, Direct Return Traps
Lifting Traps, Separating Traps

ESPECIALLY ADAPTED FOR PAPER MILL USES

The best trap made to remove the steam condensation from paper machine dryers. Works on a new and improved principle different from any other trap on the market.

Let us send you further information

THE ELLIS DRIER COMPANY

332 South LaSalle Street Chicago, Ill.

New Pulp Mill in Louisiana

The Bastrop Pulp and Paper Company, which is building a pulp mill at Bastrop, La., to be completed within the next sixty days, has contracted for 30,000 cords of wood in several northeastern Louisiana parishes to be shipped over the Arkansas & Louisiana Missouri railway to the mill during the winter. Orders for the wood supply amount to about 2,500 to 3,000 carloads and a good sized army of workmen will be employed during the winter to supply the demand. Most of the wood will be cut along the A. & L. M. between Monroe and Bastrop.

New Use for Boxboard

What is declared to be the largest single contract for cardboard cartons ever made in Los Angeles has just been placed with a local manufacturer by the Los Angeles Pressed Brick Company. The order called for 900,000 of these containers, which will be used in inclosing enamel and ornamental brick being manufactured at the local plant of this company for delivery to other cities. Under the modern system of handling the better grades of brick manufactured by the company, each brick is shipped in a separate container to prevent injury.

Speaking before the Rotary Club at Montreal, Can., Art Harries, president and manager of the Canada Paper Box Company, intimated that his firm is about to embark in a new departure in the manufacture of paper barrels. An example of the barrel was exhibited which they proposed to make, suitable for the shipment of flour, lime, dyes, sugar, butter, lard and other goods. Preparations are under way for the installation of the necessary machinery for the manufacture of these barrels.

The Pulp and Paper Sales Corporation, of New York, has been incorporated by A. A. and E. R. Mosher and H. Deverich. The concern will be operated for the present in conjunction with the E. R. Mosher Company at 51 East Forty-second street, New York City, and will handle the commission end of that business. The accounts of the New York & Maryland Pulp & Paper Company will also be handled through the new company. E. R. Mosher is president and H. Deverich vice president.

A further voluntary reduction of $10 a ton from the contract price for newsprint paper has been announced by the Minnesota & Ontario Paper Co., for the months of October, November and December. This is in addition to a reduction of $5, which has previously been given. The price will be $88 per ton.

The Waterway Paper Products company of Chicago has given to the Fort Dearborn Trust and Savings bank a trust deed for $450,000, six years, 7 per cent, on the first $1,000,000 unit of the $4,000,000 print paper plant now being built at South Kedzie and the river from plans by Frank D. Chase, inc.

The Pride Pulp & Paper Company, Tomahawk, Wis., has increased its sum total of preferred stock $50,000. The total number of shares was increased from 12,000 to 12,500 and a dividend of 7 per cent wil be paid preferred stockholders, quarterly.

The Bermingham & Prosser Co., Chicago, wholesale paper jobbers, have taken 11,000 square feet of warehouse and office space in the building of Ginocchio, Costa & Co., at 320 North La Salle street, for a term of years at a total rental of $16,066.68.

SCREEN PLATES *and* DANDY ROLLS

Watermarking a Specialty

Central Manufacturing Co.
The Quick Service House
KALAMAZOO MICHIGAN

Remember
WM. A. HARDY & SONS
FITCHBURG, MASS.
Originators and Oldest Manufacturers
OF THE
Cast Bronze Screen Plate
ALSO SPECIALIZE IN
Acid Resisting Digester Parts

UNION SCREEN PLATE CO.
Fitchburg, Mass., U. S. A. Lennoxville, P. Q., Canada
UNION BRONZE SCREEN PLATES
(Best phosphorized Cast Metal)
Old Plates RECLOSED and RECUT to accurate gauge
UNION BRONZE SCREWS for Screen Plates
Immediate Delivery of the Largest Orders. Satisfaction Guaranteed
The Witham Screen Plate Fastener, Patented
THE ORIGINAL THE BEST

Ticonderoga Machine Works
TICONDEROGA, N. Y., U. S. A.
MANUFACTURERS OF
WARREN IMPROVED CALENDER DOCTORS
With Flexible Blades, Universal Adjustment and Control
(PATENTED)
WARREN IMPROVED PATENT DOUBLE DRUM WINDERS
Patent BALL VALVE Hydrant
Stock Circulating Systems *and*
other Paper Mill Specialties
SEND FOR OUR BULLETIN

You too can make the Yale Way your Way

THE shops of The Terry Steam Turbine Company give impressive evidence of Yale Way Efficiency.

More than 50 Yale Spur-Geared Chain Blocks are used here for swinging the work into place at the various machines and on to the final assembly. This is the Yale Way.

You may not manufacture turbines but there's Yale Way Efficiency for you nevertheless.

Yale Spur-Geared, Screw-Geared and Differential Chain Blocks, Electric Hoists, I-Beam Trolley Systems, Electric Industrial Trucks, Tractors and Trailers introduce substantial savings wherever installed.

Yale Made is Yale Marked

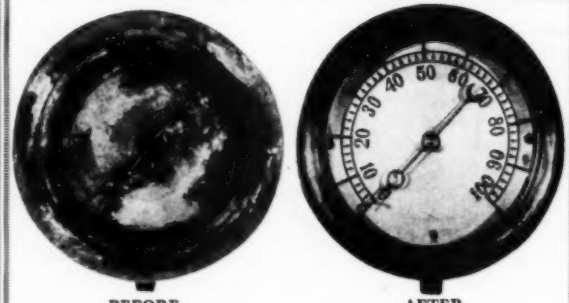
The Yale & Towne Mfg. Co.

Makers of Yale Products:
Locks, Hoists and Electric Industrial Trucks.

Stamford, Conn. U. S. A.

YALE Hoisting and Conveying Systems

One Gauge Repaired Free



BEFORE AFTER

Specializing Pressure Gauge Repairing All Styles, All Makes, Including Pyrometer and Recording Gauges, Marine Clocks and Rev. Counters

REGARDLESS OF WHO MANUFACTURED YOUR GAUGES, Regardless of their CONDITION, we GUARANTEE to put them in First Class Working Condition

We request you to send one gauge to be repaired—no charge—as a sample of the quality and delivery of our work.

Immediate delivery of work that is uniformly excellent, at a satisfactory cost.

The Manning Gauge Company, Inc.

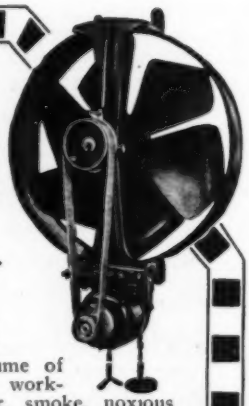
77 Traverse Street, BOSTON, MASSACHUSETTS

FRESH AIR

is as essential to the efficiency of your working force as modern tools or office equipment,

The Bayley

Junior DISC FAN



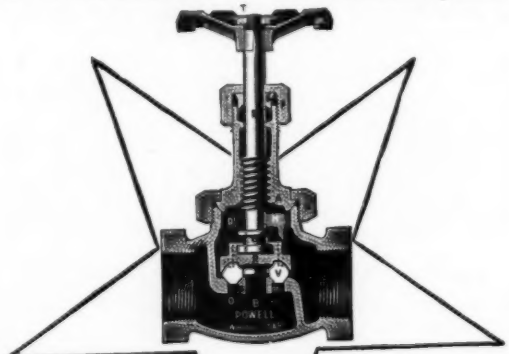
supplies a constant volume of pure fresh air to your workrooms, removes foul air, smoke, noxious fumes and keeps your working force at its highest and most productive pitch.

It is made in sizes from 20 to 48", either for line shaft drive, or with variable speed motor drive. The patented adjustable belt-tension speed regulating device permits the use of a standard constant speed motor, yet allows a speed variation of from 2½ to 100% of full speed.

Send for bulletin today

BAYLEY MFG. CO.
Dept. B MILWAUKEE, WIS.

POWELL WHITE VALVES



DOUBLE-LIFE DISC of non-corrosive white "POWELLIUM"

SLIP-ON Disc Carrier protects the unused face of disc

Exclusive claims to SUPERIORITY of the "WHITE STAR" VALVE

Ask your dealer for Powell Valves or write us

The Wm. Powell Company
Cincinnati, Ohio

Karl Gustaf Nils Hanson

K. Gustaf N. Hanson,a well known sulphite engineer, passed away in Montreal on the 13th of August, 1921.

Mr. Hanson was born in 1880 in Sweden, and came from the old sulphite maker family, of which Magnus and Nils, his uncles, and Magnus, Jr., his brother are members also. He graduated as a mechanical engineer from Chalmers Technical Institute of Gothenburg, Sweden, and thereafter worker as an engineer in the construction and operation of several Swedish sulphite mills.

Mr. Hanson came to the United States in 1913 and entered the employ of the New York & Pennsylvania Paper Company, Johnsonburg, Pa., where he remained until 1915, when he was appointed general superintendent of the St. Lawrence Pulp & Lumber Corp., Chandler, Que.

In the fall of 1916 he was made chief engineer of the Ha! Ha! Bay Sulphite Company, Ltd., Port Alfred, Que., and supervised the construction of this mill. When the mill commenced manufacturing, early in 1918, Mr. Hanson was appointed mill manager and remained in that capacity until the fall of 1920, when he took up the position of assistant to the local manager of the Kipawa plant of the Riorden Company, Ltd.

The great success of the Ha! Ha! Bay Sulphite Company, starting up the mill and getting up to full production in record time, was to a large extent due to Mr. Hanson's efforts.

He was considered one of the best sulphite engineers in Canada and a man of sterling qualities, whose loss is deeply felt among a great number of friends. He leaves a widow and little daughter.

John S. Koster Passes Away

Maj. John S. Koster, pioneer wood pulp and paper manufacturer, a hero of the Civil War and one of the best known men in New York State, died recently.

For five or six years after the Civil War, Maj. Koster was employed in the Boston postoffice. He rose to a responsible position in the office, but decided to return to paper making. In 1872 he became superintendent of a paper mill at Lancaster, N. H. Next he went to Nova Scotia as manager for an English company about to manufacture wood pulp under a German patent. He made there the first all-wood paper made in America. His success attracted attention in the United States, and he was induced to take the position of superintendent of the Herkimer Paper Company. He went to Lyon Falls in 1876 and took charge of the big pulp mills there, of which Warner Miller was president. With new mills and improved machinery he increased the output of the plant many fold.

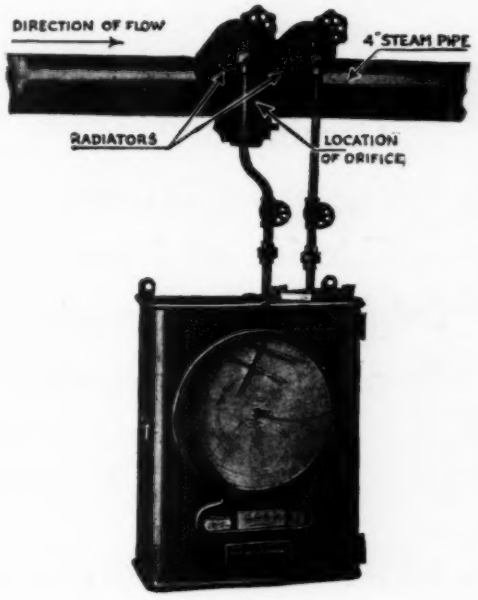
To Operate Oliver Filter at Chemical Show

At the National Exposition of Chemical Industries in New York, beginning Sept. 12, 1921, an Oliver Continuous Filter will operate at booth No. 321 on wood pulp. This will be a complete installation of semi-commercial size, and will graphically demonstrate the wonderful advantages of Olivers over wash pans or diffusers for washing chemical wood pulp, as it will duplicate brown stock washing for recovery of cook liquor from soda stock in a pulp plant.

The use of Olivers for brown stock washing is an innovation, but its efficiency is greater than former methods, and operating costs are only a fraction of former figures. Judging from the endorsement of all pulp makers to whom it has been presented, Olivers constitute the most important forward step in pulp manufacture in recent years.

E. T. Barnes has been named manager for the Oregon Pulp & Paper Company with headquarters in Salem, Oregon. Mr. Barnes assumed his new duties recently.

Bailey Fluid Meter



PRACTICAL — ACCURATE

This shows the Bailey Fluid Meter complete for the measurement of steam. It consists of the Monel metal orifice installed between a pair of flanges, radiators and valves tapped into the pipe on the inlet and outlet sides of the orifice and pipes connecting these to the recorder.

Bailey Fluid Meters are easily and cheaply installed as changes in piping are not required and the accuracy is guaranteed.

They are the most practical and satisfactory meters for recording and integrating the flow of steam to turbines, digesters, paper machines and other processes. Steam can be measured at any pressure and temperature, exhaust steam included.

Either pressure or temperature recorders, or both, may be added to record on the same chart as the rate of flow.

Our engineering department is ready to suggest the proper equipment for your service.

The BAILEY METER COMPANY
2023 East 46th Street, CLEVELAND, OHIO

We specialize in raw materials for the manufacture of all grades of paper and offer from stock:

Casein

Casein Solvents

Vegetable Tallow

Chloride of Lime

Sulphate of Ammonia

Sulphate of Magnesia

COLORS *SIZINGS*

A. KLIPSTEIN & COMPANY
644 Greenwich Street
NEW YORK CITY

BUILD NOW

The history of American business development shows that its remarkable progress is due largely to the courage, foresight, boldness, and broadness of vision of our leaders.

Such qualities were never needed more than they are today.

If we are to pay our huge war bills, develop our domestic markets and take a place among the large trading nations of the world, we must multiply our production many times.

In order to do this we must have greatly increased manufacturing and trading facilities.

Let us not pay too much attention to prices but rather give heed to the great need.

Ranger Built Is Well Built

Casper Ranger Construction Co.
Main Office, HOLYOKE, MASS.
BRANCH OFFICES
Springfield, Mass. New York, N. Y.
Boston, Mass.

Rubber Covered Felt Rolls

DO YOU KNOW

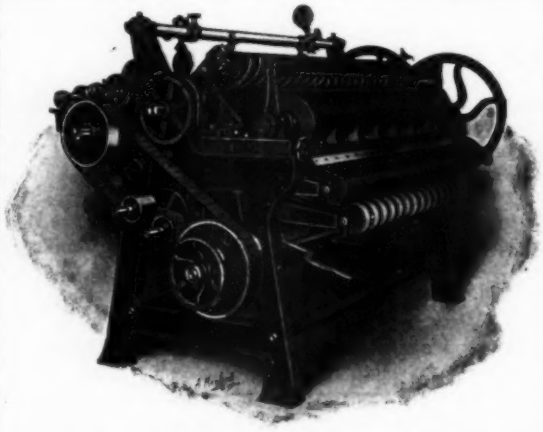
That we cover Felt Rolls with Rubber that give better service than Brass Covered Rolls?

Our Rolls wear perfectly smooth. When once installed they require no further attention.

Write for names of satisfied customers using our rolls.

We Are Rubber Roll Specialists
Our Press Roll Stocks Are
the BEST on the Market.

The American Wringer Co.
Dept. R WOONSOCKET, R. I.



PAPER CUTTERS

Single, Duplex, and Diagonal

CUTTER KNIVES
PATENT TOP SLITTERS

Hamblet Machine Co.
LAWRENCE, MASS.

News Personals

Announcement is made that Charles Drury Jacobs, of the American Paper Mills Company, New York, will enter business for himself in the near future. Mr. Jacobs has for more than twenty years been identified with the manufacture and sale of high grade papers and bears a reputation as a paper expert. In 1914 after several years of research work he succeeded in establishing what is known as the "Drury Standardized Lines" of high grade papers, and at that time obtained patents on the "Drury" shaded watermark. The idea of standardization introduced by him received its highest possible endorsement when the War Industries Board during the war limited the manufacture of bond and writing papers to five different grades. Associated with Mr. Drury in his new enterprise will be W. E. Grout, a recognized authority on shaded watermarks.

The firm of Murray & Stevenson has been organized, with offices at 30 East Forty-second street, New York, by R. P. Murray and Charles R. Stevenson to act as purchasing agents for a number of envelope manufacturers who are members of the American Envelope Manufacturers' Association. Mr. Murray has been in the envelope field for many years, while Mr. Stevenson is secretary of several trade organizations, including the American Envelope Manufacturers' Association, the Bureau of Envelope Manufacturers, the Label Manufacturers' National Association, and the Boxboard Manufacturers' National Association.

In order to render even more prompt and efficient service than heretofore, F. C. Rowley, Philadelphia representative of the International Paper Company, has opened an office in the Victory Building, 1011 Chestnut street, Philadelphia. Mr. Rowley will continue to call on the trade in Washington and Baltimore, but always can be communicated with through the new Philadelphia office. Mr. Rowley's affiliation with the paper trade dates back to 1890. He became associated with the International in 1898, resigned in 1901, and two years ago reentered the service of that company.

Owing to a change in the administrative plan of the Mid-West Box Company, J. W. Rose, who has been manager of the company's Anderson plant for a number of years, is being transferred to the company's general offices at Chicago. A. W. Cheely, who has been superintendent, will take charge in the capacity of both manager and superintendent.

John J. Warren of Brownville, N. Y., president-treasurer of the Warren Parchment Company of Dexter; vice president of the St. Regis Paper Company and head of the Harmon Paper Company of Brownville, will wed Miss Dolly M. Handley, states a report from that section.

James C. Deery, formerly with the Seaman Paper Company and the Denison-Pratt Paper Company, has opened an office at 1270 Broadway, New York City, where he is acting as selling agent for mills producing book and news print paper.

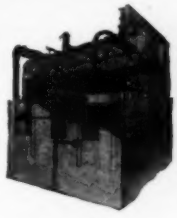
John Matthews, Jr., has severed his connections with the Parsons Trading Company, of New York, with which he was associated for many years, and has joined the Miami Paper Company, whose mills are at West Carrollton, O.

Offices of James J. Boyd, Inc., distributors of box boards, have been moved from 390 West Broadway to the Cuyler Building at 116 West Thirty-second street, New York City.

The plant of the American Strawboard Co., at Quincy, Ill., has been started up, after being closed down since April.

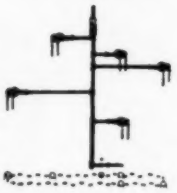
DIAMOND
VALV-IN-HEAD
SOOT BLOWERS

The principle of the Valv-in-Head Soot Blower is so new and so different that its possibilities can hardly be adequately described.



Take, for instance, the matter of labor—the new Diamond head effects a saving of fully 50% as compared to other types of hand operated units. Note how this is accomplished:

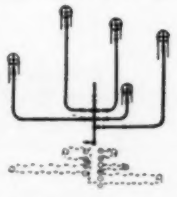
(a) The total time required for blowing is cut squarely in half.
(b) There is no walking back and forth from blower operating chain to valve—a single round trip completes the cycle of operations.
(c) Only one man is required, no matter how large the boiler. (With other types of blower heads two men are customarily employed on large boilers.)



Under these conditions the cost of labor becomes an almost negligible factor in the cost of operating the soot blower.

The saving in steam is just as pronounced, because every bit of steam does effective work in cleaning the boiler. Note how waste is avoided:

(a) No steam is discharged while the operator is walking.
(b) Steam jets are in rotation throughout the entire blowing period.
(c) Speed of rotation is controlled by gear reduction. No waste of steam occurs as the result of too slow or too rapid operation.
(d) Globe valves, essential to other heads, require many valuable moments to open and close, during which steam is wasted. The instant operation of the Valv-in-Head eliminates losses.



Saving steps saves steam. Valv-in-Head means single round trip. No steam while walking. Independent valves mean steps retraced, steam wasted while walking.

These are only two of eleven important advantages of Diamond Valv-in-Head soot blowers. Others include savings in pipe, valves and fittings, maintenance, gain in cleaning efficiency, etc., etc.

Every boiler needs a mechanical soot blower and you will save money by buying the best. Diamond Valv-in-Head blowers are adapted to all types of water tube boilers. On request our Service Engineer will go over your existing soot blower installation and advise whether it can profitably be replaced with the Diamond Valv-in-Head system. Ask for your copy of Bulletin 297 describing the new blower.

DIAMOND POWER SPECIALTY COMPANY
Detroit, Michigan

Diamond

SOOT BLOWERS - SAVE 4 to 8% FUEL

PULP STONES OF QUALITY

IRONSIDES BRAND

THE CLEVELAND STONE COMPANY has a pulp stone quarry 50 feet in depth with sheets of rock 10 to 15 feet thick and can furnish any size stone now in use.

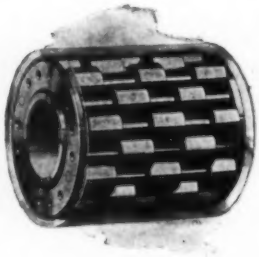
The CLEVELAND STONE COMPANY

Eastern Branch
283 Front Street
NEW YORK

Main Offices
1836 Euclid Avenue
CLEVELAND, OHIO

Correct Design
The Best High Chrome Steel
Precision Manufacture

The PROOF is in Performance



The A. P. W. Paper Co., by substituting the Hart STAGGERED Roller Bearings on PRESS ROLLS, have reduced loss of production from bearing replacements.

You, too, can reduce operating costs by installing "THE QUALITY" bearings.

Made only by

The Hart Roller Bearing Co.

ORANGE, N. J.

Stickle Compound Condensing System

and Automatic Steam Control *for Paper Machines*

As shown in the folder we sent out to the mills—"*How to Dry Paper*"—showing our Compound Condensing System for draining the dryers and heating the air with the discharge from the dryers to condition the machine room should interest you. We guarantee a saving of 20 per cent in steam consumed for this purpose.

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WE-FU-GO AND SCAIFE WATER

PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO., PITTSBURGH, PA.

Foreign Trade Opportunities

A firm of wholesale commission merchants in Italy desires to purchase tissue paper for lemon packing. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 35350.

A mercantile company in Ireland desires to purchase and secure an agency for the sale of wrapping paper. Quotations should be given c. i. f. Great Britain. Reference. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 35266.

A druggist in Japan desires to purchase sensitized paper for photography. Quotations should be given c. i. f. Kobe or Keelung. Terms: Cash against documents. Reference. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 35244.

A mercantile company in Greece desires to secure an agency for and purchase printing, news, wrapping, parchment and other kinds of paper. Quotations should be given c. i. f. Levant ports. Payment: Cash in dollars against established and confirmed credit through New York banks. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 35347.

A mercantile company in India, desires to purchase old newspapers. Quotations should be given c. i. f. Karachi or Bombay. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 35246.

A mercantile company in India desires to purchase paper and stationery supplies. Quotations should be given c. i. f. port of India, or f. o. b. New York. Terms: 30 days, payment against documents. Reference. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 35325.

The director of a college in Peru desires to purchase school supplies of all kinds, including paper. Quotations should be given c. i. f. Peruvian port. Terms: Cash or 30 days, through Peruvian representative in the United States. Reference. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 35328.

Dodge Sales Erecting New Building

The Dodge Sales & Engineering Company of Mishawaka, Ind., announce that the excavation for their new $1,000,000 building in New York City at 49 Park place is practically completed. The new building, which will probably be known as "Power and Transmission Building," will occupy 165 feet on West Broadway, 50 feet on Murray street and 75 feet on Park place. Present plans call for twelve stories, but foundation and construction will permit of an additional four stories if needed. Occupancy is expected by May 1st, 1922.

Link-Belt Company announces a practically uniform reduction of 10 per cent on malleable iron and steel ("S class") chains, sprockets, buckets and other products, effective at once. Discounts on application.

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Lawrence, Mass.

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Cornwall Pulp & Paper Co., Ltd., Cornwall, Ontario
Specialty Paper Mills, Ltd., Camden East, Ontario
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INCORPORATED
200 FIFTH AVENUE
NEW YORK

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PAPER MAKERS' SUPPLIES
CHEMICAL AND MECHANICAL PULPS
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WISCONSIN FOURDRINIER AND CYLINDER WIRES
COTTON AND RUBBER BELTING
COTTON CUTTER TAPES
FELT WASHING SOAP
APRON CLOTHS
PULP, GLAZING AND COATING COLORS

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60 India Street
Boston Massachusetts

NORWOOD

Mechanical Filters
Will Deliver Clean Water

Gravity and Pressure Types
All Sizes to Suit Location and Conditions

Write For Information

Norwood Engineering Co.
Florence, Mass., U. S. A.

The W. A. Jones Foundry & Machine Company, Chicago, announce the appointment of Mr. Robert B. Moir as manager of their New York branch. He will assume his new duties immediately, making headquarters at the present sales office and transmission warehouse of this company, 20 Murray street. Mr. Moir has been actively connected with the home office and factory for a number of years and is exceptionally well qualified to assist in power transmission and general engineering problems. This change will enable the Jones company to co-operative with their many friends in the New York district even better than in the past.

B. G. Dann, who for the past four years has been connected with the engineering department of the Truscon Steel Company in Youngstown, Ohio, and New York City, has resigned to accept a position as manager of the New York office, 30 Church street of the Hendrick Manufacturing Company, makers of perforated metal screens, elevator buckets, general sheet and light structural work, also light and heavy steel plate construction. Mr. Dann is a graduate of the engineering department of the Lafayette College.

The Mystic Chemical Products Company, a new concern in the color field, has been organized in Boston by Wendell P. Turner, former chemist with the Hampden Paint & Chemical Company, and Roy J. Whittemore, a former salesman for Whittemore & Wright of that city. The new company is to be represented by the Morey Paper Mill Supply Company of Boston as sales agents. Pulp and lake colors for staining, coating, glazing and printing are the new company's specialties.

Reports from all parts of the country indicate a considerable improvement among paper box manufacturers. This should mean the use of a larger amount of all classes of box board, and orders for the mills.

James J. Boyd, Inc., of New York City, have moved their office to the Cuyler Building, 116 West Thirty-second street, where they will continue to handle the same high grade lines of paper box boards as heretofore.

J. W. Stephenson, formerly western manager in Chicago for the Hart Trading Company, of New York, is now manager of the Chicago office of the Northern Paper Mills, of Green Bay, Wis.

The Imperial Wallpaper Company, manufacturers of hanging paper at Queensbury, Warren County, N. Y., has filed notice of an increase in its capital stock from $750,000 to $900,000.

Tenders are desired by a Government Department of Victoria, Australia, on a complete plant capable of manufacturing a minimum of 100 tons of straw board a week. Boilers or steam engines are not wanted. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 35157.

Investors—Attention

A patented process for the utilization of Waste Paper, in the production of a moisture-proof, indurated material, for forming kegs or strong special containers, owner solicits correspondence with interested parties. J. H. KING, 720 W. 9th St., Cincinnati, Ohio.

If Anyone Has—

Killed a pig,
Shot his wife,
Got married,
Borrowed a stamp,
Made a speech,
Joined the army,
Robbed a bank,
Bought a Ford,
Sold a dog,
Lost his wallet,
Gone fishing,
Broke his neck,
Bought a house,
Committed suicide,
Shot a cat,
Been away,
Come back home,
Moved his office,
Taken a vacation,
Been in a fight,
Got licked,
Has no oil stock,
Got rich,
Made a bad bet,
It's news—
SEND IT TO THE EDITOR.

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Our Cylinder Wet Felts for 9 points straw and for roofing are *open* in texture, *do not* stretch and *are durable.* A trial is invited.

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Contains 99+%
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CAUSTIC SODA 76%
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Sodium Hydroxide

Crown Filler for Paper Manufacture

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THE SOLVAY PROCESS CO.

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Caustic Soda 76%

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PITTSBURGH **PENNSYLVANIA**

THE paper industry continues to be characterized by rather quiet conditions. Business is principally of routine nature, yet such changes as are occurring in the market are invariably toward improvement. There is a good deal of complaint registered by manufacturers and merchants over the dullness obtaining, nevertheless everything would seem to point to matters being somewhat more favorable than members of the trade are generally willing to concede. One great trouble with paper producers and dealers today is that they are inclined to gauge present market conditions by the situation prevailing early last year when the after-the-war boom was in full bloom, whereas, in order to acquire a more correct idea of business conditions, they should compare the present with more normal times such as existed prior to the war. It seems safe to say that, based on the volume of business transacted in normal periods before the war, the amount of trade activity in paper at present is not nearly as poor as a majority connected with the industry are prone to believe. It is true that buyers of all kinds of paper are proceeding very cautiously, and that current orders are almost solely for paper required to cover immediate wants, yet it would appear that business is aggregately not so far below normal as many are disposed to presume.

The last report of the Federal Trade Commission, covering the month of June, shows that production of paper of all kinds increased a few thousand tons above the May output, and that in spite of the larger production, mill stocks of paper declined during the month. This would indicate that manufacturers are shipping out not only their current production but also a part of their surplus stock, which most assuredly is a healthy condition. Moreover, inquiry for most kinds of paper is on the rise. Jobbers report that customers are gradually increasing the number of their orders, as the need for larger amounts of paper is felt, and there is a disposition among consumers to look ahead in respect to paper supplies although few of them have as yet resumed buying against future requirements.

There seems little doubt that the fall will bring substantial improvement for the paper trade. As consumers' needs expand they will automatically broaden their buying, and it stands to reason that with business conditions generally showing a better tone the consumption of paper will steadily mount. There are occasions when business in a commodity is hampered by the prices prevailing. When buyers lose faith in the stability of prices, they promptly refrain from absorbing other than actually required amounts of the commodity concerned. In the present situation in paper, price is standing in the way of very little business. The reason consumers are purchasing so carefully is that they are uncertain as to conditions in their own line. Prices on most classes of paper have been gradually lowered until they are on a level comparing very favorably with pre-war normal levels, and were consumers in need of larger quantities of paper there is no question but that they would freely expand their buying operations.

News print offers an apt illustration of the prevailing situation in the paper market. It is estimated that publishers in the United States are consuming within 4 per cent of the amounts of news print used last year, which means that consumption this year is showing but a negligible decline from that of 1920, when consumption exceeded all previous records. Mill stocks of news print are steadily decreasing, judging from Federal Trade Commission statistics, and publishers are understood also to be drawing on their own stocks held in warehouses, which were abnormally large toward the close of last year. This means that consumption is actually running in excess of production, which can only result in a healthy and strong market condition in due time.

Rumors from Canadian sources to the effect that manufacturers there plan to reduce the contract basis on news print for the final quarter of the year to $80 per ton, a decline of $15 a ton from third quarter basis, together with offerings of imported news print at prices below the domestic market, have a weakening influence on prices, yet the contract basis on roll news print is maintained at $95 a ton at the mill for current deliveries and most spot sales of news print are at around $90 per ton f. o. b. mill. Importations of news print from Scandinavian countries and Germany are said to be running at a rate of about 120,000 tons annually. This is equal to about one-tenth of the United States' 1920 production and about 6 per cent of the present consumption. Paper from such sources is reported offered in moderate tonnage at $80 a ton, while some lots have been marketed here at a good deal under this figure.

Quotations on book papers hold fairly steady. Machine finished book is quoted at 6 to 6.50 cents per pound f. o. b. delivery points, with reports heard of some sales down to 5.75 cents. Certain mills are naming a differential of but a quarter of a cent per pound on super book though a majority are asking from a half to three-quarters of a cent per pound above machine finished.

Fine papers are characterized by probably a quieter demand than any other class of paper, and quotations are irregular. Coarse papers are moving in fair tonnage. Kraft wrappings hold up well in price at 5.50 to 6 cents on No. 1 domestic, while tissues are in good demand at a basis of between 95 cents and $1 per ream on No. 1 white. Box boards are in somewhat better demand and quotations display a stiffening tendency. Plain chip is quoted in New York at $28 to $30 a ton and solid news board at $35 to $40.

New England Salesmen to Meet

Following out plans developed by H. H. Reynolds of Housatonic, Mass., President of the Salesmen's Association of the Paper Industry, and Arthur E. Ford of Springfield, Mass., Vice-President for New England, elaborate plans are being made for a conference of the paper industry salesmen of the entire New England district, at Boston, on Wednesday, September 14. The meeting will be in conformity with a national plan of paper salesmen to have conferences to discuss business conditions, but the summer meetings are being chiefly social.

The salesmen will meet at the Hotel Copley Plaza where machines will be taken to the Tedesco Country Club at Swampscott. A business meeting will be held immediately upon arrival, and after luncheon there will be golf or a drive to Gloucester as the visitors prefer. At 6 o'clock the entire group will meet again at the Corinthian Yacht Club at Marblehead Neck for a shore dinner.

The Boston committee consists of John E. A. Hussey, Chairman, and Thomas Compton Walsh, Clarence S. Anthony and George T. Standbridge.

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& STOCK CO.

Assorted Waste Paper
in Large Quantities

240 North Front Street, Philadelphia

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FREDERICK BERTUCH, SPECIAL PARTNER
21 East 40th Street, New York City

Importers of Chemical Pulps
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Sarpsborg, Norway; Forshaga, and Edsvalla, Sweden;
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ESTABLISHED 1895

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Now Is the
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Our Raw Materials

Out of the forty different kinds of paper stock graded in our many large warehouses, you are assured a steady, reliable source for procuring raw materials in practically every branch of paper making.

Having specialized for 35 years in this one field you can depend upon a clean, well-packed, uniform product throughout; fulfillment of delivery promises; and because of our output of 300 tons daily, big tonnage at all times.

Write us your wants and we'll gladly send further information.

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ANIMAL SIZING GLUE STOCK

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Papermaking Rags

Although most kinds of papermaking material are commencing to show increased activity and prices are stiffening to at least an extent, rags thus far have failed to share in the improvement. Just why this is so, it is difficult to say unless it is that those mills using rag stock have sufficient rags on hand to cover present requirements while operating on reduced schedule, and, presumably feeling that there is little danger of a scarcity of rags arising, are refusing to buy ahead. At any rate, rags are moving into consuming channels in light volume. Demand is very spasmodic and in the aggregate involves but a small tonnage of material. Dealers report that offerings to mills invariably elicit the reply that the latter are not interested in buying at present, and aside from occasional sales of small quantities, business is decidedly slack.

Nevertheless the tone of rag prices seems somewhat firmer than it was a short while back. This appears due to several reasons, the principal of which is that dealers are imbued with a feeling that a larger demand for rags will prevail in the fall and winter, and as the summer nears a close stocks are held with increased firmness. Another reason is that it is generally conceded that collections of rags this summer all over the country have been light. Low prices have discouraged collectors, and it is probable that fewer rags have been gathered in recent months than in a similar time in many summers. The great bulk of rags available in the country today are in the hands of graders and dealers who have paid higher prices than are at present obtainable in sales to mills, and this prompts most dealers to adopt a firmer attitude regarding prices, particularly since the fall is drawing nigh.

Such changes as have occurred in prices have been downward. This is but logical because demand has not been sufficient to create any enhancement of values. It is quite noticeable that quotations in the East are proportionately much lower than in the West, this being attributed mainly to the stronger financial position of most dealers in the West. No. 1 white shirt cuttings have been sold by New York packers down to 8 cents per pound, whereas this class of rags are held in the West at fully a cent a pound higher. Roofing rags in the East are selling at 60 to 65 cents a hundred pounds for No. 2 satinets, while in the West 80 cents, and even more, is being obtained for these rags. New washables have slumped badly in price owing to the refusal of Holyoke mills to buy, and offerings at 3 cents a pound at shipping points meet with little response. Old whites and blues are in slight demand and have declined further.

Average quotations f. o. b. shipping points follow:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	8.00-9.00
White shirt cuttings, No. 2	5.50-6.00
Fancy shirt cuttings	5.00-5.50
Washables, No. 1	3.00-3.25
Unbleached muslins	7.00-7.25
White lawns	7.25-7.50
Overall cuttings, blue	5.25-5.50
Black silesias	2.75-3.00
Old Stock—	
Whites, No. 1 repacked	4.50-5.00
Whites, No. 2 repacked	2.50-2.75
Whites, house soiled	1.25-1.50
Whites, street soiled	1.00-1.15
Thirds and blues, repacked	1.50-1.75
Thirds and blues, rough	.90-1.00
Black stockings	1.50-1.65
Lace curtains	4.25-4.50
Cotton canvas, No. 1	3.00-3.25
White cotton batting	1.20-1.40
Roofing, No. 1	.70- .90
Roofing, No. 2	.60- .80

Rope and Bagging

Old manila rope is meeting a fairly steady demand, and while the volume of mill buying is not heavy, consumers are absorbing enough rope to firmly sustain prices. Moreover, every indication seems to point to unsold supplies of old rope being low, and this is a sustaining factor. With the shipping industry in a dull condition, less old rope is being produced, and dealers assert that they are not beginning to get normal amounts of material, with the result they can hold more or less firm for full quoted prices. Around 4 cents per pound at shipping points is the price prevailing on domestic manila rope in No. 1 condition, with now and then a sale reported at a little under this level, but on the other hand with some dealers in the West reporting sales up to 4.25 cents. Foreign rope is selling at an average of 3.75 cents a pound.

Demand for old bagging fails to broaden and but small lots are moving to paper mills. Prices are largely nominal with conditions favoring buyers securing such supplies as are wanted at recessions from the figures asked by sellers. No. 1 scrap can be freely bought at 75 cents a hundred pounds, and less, while No. 1 gunny bagging is quoted at around one cent a pound and roofing bagging at about 50 cents per hundred.

Quotations f. o. b. shipping points are:

	New York and Chicago
Gunny, No. 1 domestic	1.00-1.10
Gunny, No. 1 foreign	.90-1.00
Scrap bagging No. 1	.65- .80
Roofing bagging	.45- .55
Wool tares, heavy	1.50-1.75
Wool tares, light	1.25-1.50
Manila rope, No. 1 foreign	3.75-4.00
Manila rope, No. 1 domestic	4.00-4.25
Sisal strings	1.50-1.75
Mixed strings	.65- .75

Old Papers

There is more demand for old paper and prices have stiffened to quite an extent. In fact, the trend of values is strongly on the upgrade notwithstanding that prices have advanced from $3 to $6 per ton during the past several weeks. The reason for the rise seems to be more to do with conditions obtaining in the packing trade than to demand from consuming quarters, though there is no gainsaying that mills are buying in larger amounts and that this has been a contributing factor in the advance. The drop in collections, however, appears to be the principal cause for the uptrend in values. Prices on waste paper worked down to such low levels that collectors in a great many cases stopped gathering material, while dullness in the printing trade also served to reduce supplies. Nevertheless there are many who argue that waste paper prices cannot go much higher than now prevail so long as wood pulp prices remain on current levels.

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Dealers in Wayoganiack Kraft
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STANDARD BLEACHING POWDER

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High Grade Printing Paper

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BOOK AND COATED PAPER
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CASEIN

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Bleached and Unbleached
WOOD PULP
of Every Description

M. GOTTESMAN & COMPANY
INCORPORATED

18 East 41st Street NEW YORK, N. Y.

Established 1886

Waste paper is a substitute for wood pulp, and in some instances pulp is today relatively cheaper than old paper, which condition seems bound to keep prices on the latter within certain limits as long as this situation exists.

No. 1 soft white shavings are held for at least 2.25 cents per pound by dealers, and some western dealers are quoting considerably beyond this figure. Hard white shavings of No. 1 quality are priced at around 2.90 cents per pound, old No. 1 kraft paper at 1.70 cents, ledger stock at 1.50 cents upward, and white blank news cuttings at 1.50 cents. Old folded newspapers are quoted at 40 cents a hundred in the East and at about 50 cents or higher in the West, and No. 1 mixed paper is selling at a minimum of 30 cents a hundred, with western dealers reporting mills paying higher prices. One of the strongest items in the market is old magazines. Stocks of this grade seem to be in firm hands and about the lowest quoted on No. 1 heavy books and magazines is 90 cents a hundred pounds, with sales reported in some quarters at substantially higher levels.

F. o. b. shipping point quotations follow:

	New York and Chicago
Hard white shavings No. 1	2.85-3.00
Hard white shavings Nos. 2-3	1.75-2.25
Soft white shavings	2.25-2.50
Colored shavings	1.00-1.15
Heavy book, No. 1	.90-1.00
Crumpled No. 1	.70- .80
Ledger stock	1.50-1.75
Kraft No. 1	1.65-1.75
Manilas, No. 1	.75- .85
White blank news	1.50-1.60
Overissue news, No. 1	.60- .70
Folded news	.40- .50
Mill wrappers	.65- .75
Box board cuttings	.35- .45
Mixed paper, No. 1	.30- .40
Common paper	.20- .25

Chemical Pulp

The slashing of prices on foreign pulp and the offering of fairly large supplies in this country by the Swedes and Germans at figures considerable under those quoted by American and Canadian manufacturers has created a chaotic condition in domestic wood pulp. Under the circumstances it is very difficult to obtain accurate prices on domestic grades. Producers in the United States and Canada are shipping out pulp to contract customers, but they are obtaining little additional business, as would be expected with foreign pulp pouring into the country at prices below those which domestic manufacturers say they can market pulp for at a profit. An insight into the policy which domestic producers intend to pursue is to be had through the informing of customers by a leading manufacturer of bleached sulphite that he expects to continue operating until he has ground up present stocks of wood, after which he intends to shut down his plant until such time when market conditions change where he can see a profit in making pulp. If domestic producers in general follow this policy it is quite likely a different complexion will be placed on the pulp situation.

Manufacturers are endeavoring to maintain quotations, and those appended are based on the prices named by representative concerns, but practically every grade of domestic pulp lacks an established price basis and market levels are very uncertain.

Quotations f. o. b. pulp mills are nominally as follows:

Bleached sulphite	4.00-4.50
Easy bleaching sulphite	3.00-3.25
Unbleached sulphite No. 1	2.75-3.00
News grade sulphite	2.50-2.75
Soda pulp, bleached	4.25-4.50

ALVAH MILLER, President *TOM T. WALLER, Vice-Pres.*
NATH'L L. MILLER, Sec'y-Treas.

CRAIG-BECKER COMPANY
INC.

Domestic and Foreign Ground Wood and Sulphite

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NEW YORK CITY

BATHURST LUMBER COMPANY, LIMITED

PRICE & PIERCE, LTD.
17 East 42nd Street, NEW YORK CITY

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Unbleached Sulphite 50 tons daily
Kraft Pulp 50 tons daily

Our pulp is made from Canadian Spruce
We ship in sheets, baled

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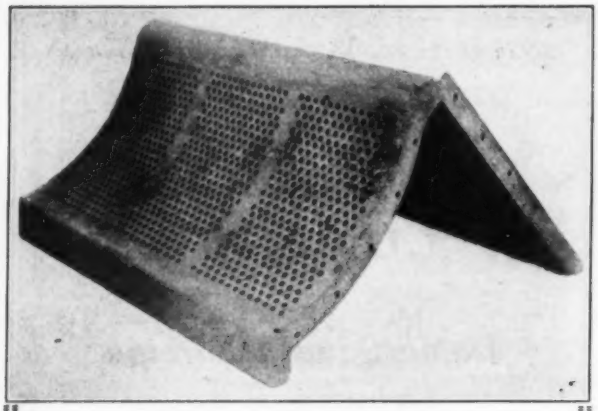
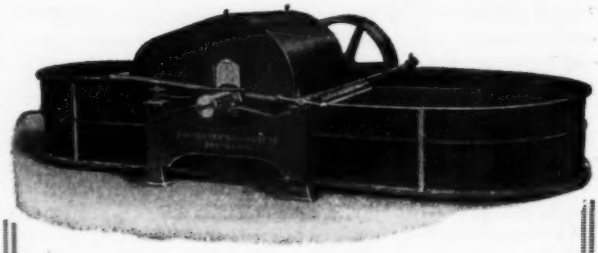


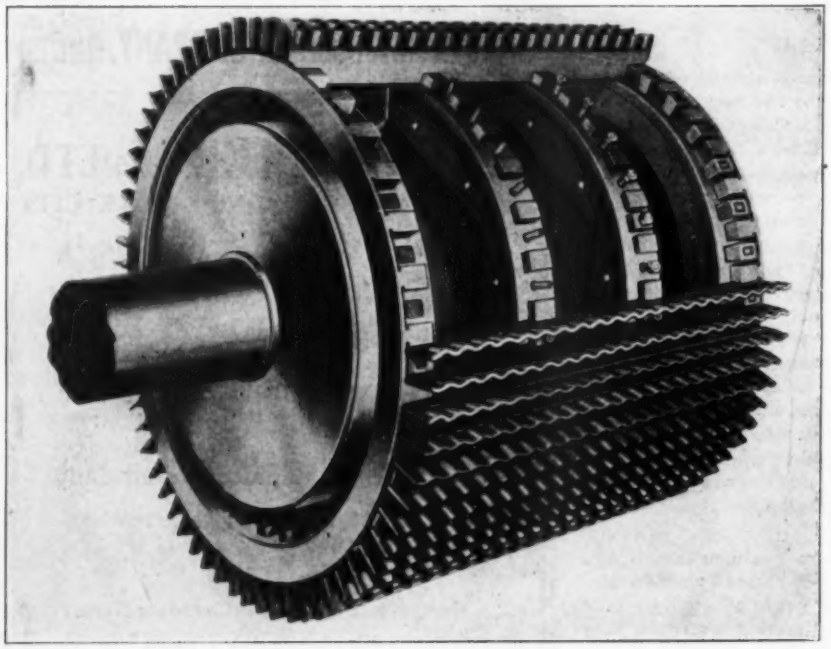
Because there are no moving parts this is a very simple but very efficient device. Patent No. 1,271,426 issued to Mr. Brownell Buehler, July 2nd, 1918.

The Shartle Continuous Beater Company
MIDDLETOWN, OHIO



"Dayton" Beating Engines are Built for Heavy Duty

Dayton Beater and Hoist Co.
DAYTON, OHIO



Ten Advantageous Points

1. Slotless bars which means no broken ears.
2. A bar designed for maximum strength.
3. Lugs on heads machine finished insuring a perfect fit.
4. Bars require no shimming.
5. Wedges self centering.
6. Wedges drawn down by heavy wrought iron bolts with brass nuts.
7. Nuts locked by ribs on cover plates.
8. Damaged bars can be replaced without disturbing the others.
9. It is unnecessary to raise roll from bearings when refilling.
10. Roll can be refilled in one-fourth the average time.

DAYTON GLOBE BANDLESS BEATER ROLL

WE SOLICIT YOUR INQUIRIES

DAYTON GLOBE IRON WORKS, **Dayton, Ohio**

Mitscherlich unbleached	3.50-3.75
Kraft No. 1	2.50-2.75
Screenings, refined	.85-1.00

Mechanical Pulp

Mechanical wood pulp is characterized by a firm price tone. There is a comparatively good movement of supplies into consuming channels, but the strongest factor at present is that low water is forcing grinding plant after grinding plant to close down, thus appreciably reducing production. Mills in Wisconsin, it is reported, are nearly all down, while grinders in Nova Scotia, in parts of New England and in Upper New York State have in numerous cases been obliged to partially or completely close. There is apparently still quite a tonnage of ground wood held by producers, but most of this supply is stored pulp, which is not considered as good quality as freshly ground pulp, and sellers are growing increasingly firm in their demands for full quoted prices, particularly on freshly ground pulp, and are mostly reluctant to contract for deliveries more than several weeks ahead.

Around $37 a ton delivered consuming points is the average price quoted on prime spruce ground wood, freshly ground, for prompt shipment, which price is equivalent on an average to about $30 a ton f. o. b. producing mills. Some small lots are selling at $28 a ton at grinding plants, and imported ground wood is available in limited tonnage at around $27 ex the dock at Atlantic ports, but as an instance of the firm position of prices it can be stated that even stored ground wood has sold at $35 a ton delivered consuming point.

Chemicals

Inquiry for papermaking chemicals is somewhat improved, though consumers continue to buy in more or less hand-to-mouth volume, which means that current transactions do not involve important quantities. Most of the business passing is against contracts, but the increased interest evinced by consumers is considered a vanguard of fall buying activity, and prompts producers to be firmer in their attitude regarding prices. Bleaching powder in domestic drums is quoted at 2 to 2.25 cents per pound for spot delivery. Casein has sagged further in price to between 6.50 and 8 cents per pound, and rosin is lower at a quotable basis of $4.85 per 280 pounds on Grade E. Soda ash holds at an average price of 1.90 cents a pound for spot shipments, and caustic soda is quoted at around 2.50 cents per pound. Quotations follow:

Alum, lump ammonia	3.50- 3.75
Alum, lump starch	4.00- 4.25
Blanc fixe, powdered	4.25- 4.50
Bleaching powder (domestic drums)	2.00- 2.25
Brimstone (ton)	15.00-16.00
Casein	8.00- 9.50
Caustic soda, spot delivery	2.40- 2.60
China clay, domestic washed	9.00-10.00
China clay, foreign	14.00-18.00
Rosin, grade E	4.85-
Satin white	2.00- 2.25
Soda ash, 58 per cent light (bags)	1.75- 2.00
Sulphite of alumina, commercial grade	1.60- 2.00
Starch, papermakers', in bags	2.20- 2.40
Talc (ton)	17.00-18.00

Quarter Stuff?

The erection of the building for the manufacture of hemlock chips for pulpwood at the Schroeder Lumber company, Ashland, Wis., has been completed, and the special machinery for it has arrived from Milwaukee. The machinery is being installed now, but the manufacture of chips will not begin until next spring, according to Manager Frank Clarke.

When the manufacture of the hemlock chips is begun, the lumber company will use up all of the wood that is now sold for firewood. The chips will be sold to paper companies, where they will be used in the manufacture of pulp paper.

HA M E T Z CO BOSTON
HA M E T Z CO PHILADELPHIA
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A complete line of
Aniline Dyes
for the paper trade
Manufactured by
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All Grades for Paper Mills

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"Wolverine"
Waxed Papers
for Every Requirement

Best Quality

Waxed Tissue a Specialty

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The Standard Utility Business Papers and the Most Widely Used Papers in the World

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NEW YORK OFFICE: 291 BROADWAY

Lincoln Paper Mills
ELKHART, IND.

Manufacturers of

Machine Finish Writings

Machine Finish and Super Calender White and Colored Book

Extra Machine Finish and Super Calender Litho

Mimeograph and Specialties

New Papers

Writing—	
White rag	13-40
White sulphite, No. 1	9.20
Colored	11-20
Ledger—	
White rag	14-50
White sulphite	11-25
Colored sulphite	13-25
Colored rag	16-50
Bonds—	
White rag	10-40
White sulphite	8-20
Colored sulphite	10-22
Colored rag	12-40
Book—	
No. 1 S. & S. C	6.50- 7.00
Machine finished	6.00- 6.50
English finished	6.75- 7.25
Coated and enameled	9.00-10.00
Lithograph, M. F	10.00-11.00
News Print—	
Rolls, contract	- 4.75
Rolls, transient	4.25- 4.50
Sheets	5.00- 5.25
Side runs	3.50- 3.75
Cover Stock—	
Coated, both sides	9.25-
Coated, one side	9.20-
Tissue—	
No. 1 white, 20x30	.95- 1.00
No. 2 white, 24x36	.95- 1.00
No. 1 manila, 24x36	.95- 1.00
Kraft	1.00- 1.25
Wrappings—	
No. 1 kraft	5.50- 6.00
No. 2 kraft	5.00- 5.50
Boards—	
	New York and Chicago
Solid news	35.00-40.00
Straw	40.00-45.00
Plain chip	28.00-32.00
White coated chip	55.00-60.00
Manila coated chip	50.00-55.00
Binders board	75.00-85.00

Pulp Dumping

Following the filing of formal complaint of dumping of foreign paper in this country by Dr. Hugh P. Baker, Secretary of the American Paper and Pulp Association, formal complaints have also been filed alleging dumping of foreign pulp by Secretary H. H. Bishop of the Pulp Manufacturers' Association, affiliated with the American Paper and Pulp Association. Unofficial advices are that there has been found to be sufficient evidence of dumping to warrant the customs authorities in requiring the filing of bonds by importers sufficient to meet any tariff that may be levied, pending further investigations by the government.

In his letter to the customs appraisers, Secretary Bishop, after quoting foreign publications to the effect that Scandinavian manufacturers must take a loss if they meet the German price of $3 per 100 pounds ex dock, U. S. A., says:

"The price mentioned in this extract is, in fact, not as low as pulp has been offered in this market, and if at $3 per 100 lbs. Swedish manufacturers claim that there is a loss, then there certainly must be a greater loss at the lower prices and a condition must exist from which the Anti-Dumping Act was intended to protect American manufacturers.

"For your further information, and as a basis for such investigation as you will undoubtedly wish to make, we have before us a quotation made to one of our members which reads as follows:

100 tons strong unbleached sulphite, imported, f. o. b. cars Baltimore, Md., 2½c per lb.

200 tons extra prime bleached sulphite, imported, f. o. b. cars New York, 4¼c per lb.

50 tons bleached sulphite, imported, f. o. b. cars New York, 4c per lb.

100-300 tons No. 1 Kraft pulp at $2.40 per cwt., f. o. b. cars New York or Baltimore (sample enclosed).

Swedish unbleached pulp, 2½c per lb. (sample enclosedé.

German Mitscherlich pulp, $55 per ton, f. o. b. cars New York (sample enclosed).

"We also have knowledge of a sale of 1,000 tons of Scandinavian No. 1 Kraft, delivery during October, November and December, at $40 per ton, ex-dock New York.

"This is the most aggravated case which has come to our knowledge and which you will note is not expected to arrive until October, November and December, thus affording ample time to investigate on the other side relative to market conditions."

Frank I. Polk May Head Commission

Frank I. Polk, of New York, Secretary of State in the Wilson administration, will head the American commission on wood pulp to negotiate with a similar commission appointed by the Canadian Government, it is said. There will be five members of the American commission, and it is understood that one of the other members will be Victor F. Lawson, owner and publisher of the Chicago Daily News.

Under the Underwood resolution recently passed by Congress, provision is made for the appointment of a commission of five to treat with a similar number named by the Dominion of Canada. The joint commission is to investigate the wood pulp industry in all its phases with a view to the ratification of reciprocal arrangements whereby American newspaper publishers will be enabled to purchase wood pulp and print paper at greatly reduced rates.

The selection of the joint commission is being held up pending the receipt by Canada of sanction from the Imperial Government to negotiate directly with this country.

Fuel from Paper Mill Waste

The tremendous amount of research work being done in all fields of manufacture to convert waste into wealth is showing gratifying results in the operation of sulphite mills through the recovery of alcohol and solid fuel from waste liquors. The alcohol is called sulphite spirit and while entirely unlike wood alcohol, it is equally valuable for power purposes, being now in steady use by the omnibuses of London.

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M.F. and S&SC Book and Catalog

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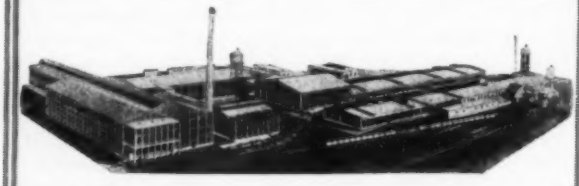

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Pure Waxed Papers
Blood-proof Meat Paper
KVP Bond—white and 6 colors

KVP Manifold—Sub. 8 and 10

Write for Samples

"World's Model Paper Mill" KVP Kalamazoo Vegetable Parchment Co. Kalamazoo, Michigan, U. S. A.

Books on Paper Manufacture

Subscriptions are being taken for the new Textbooks on the Manufacture of Pulp and Paper of the Joint Committee on Vocational Education of the Pulp and Paper Industry, a complete set of which should be owned by every firm or individual connected with the industry.

The set will be complete in five volumes. Volumes I and II, deal with arithmetical operations, elementary mathematics, drawings, etc. Volumes III, IV and V, to be issued shortly, will deal with pulpwoods and their preparation; manufacture of pulp; analytical methods; and paper manufacture in all its aspects.

Volumes I and II are now on sale at $5.00 a volume. In the selection of classroom problems bearing on the principles and practice of pulp and paper manufacture they represent the highest standard in textbook publishing.

Orders, with remittances, will be filled by Thomas J. Keenan, secretary of T.A.P.P.I., 542 Fifth Avenue, New York.

Wood Pulp

While European producers of wood pulp are not "flooding" the American market with pulp, they are exerting every possible effort to sell as much of their holdings as they can in this country, and the further fall in prices consequent to this policy has placed foreign pulp on cost levels so much below quotations on domestic pulp and so far under the market levels for the past several years that American paper manufacturers are being attracted into buying in fairly large tonnage. Certainly the great bulk of activity in the wood pulp trade during the past month has concerned imported pulp, and it can be stated that comparatively heavy amounts of foreign sulphite and kraft have been absorbed by papermakers in the United States. For the time being, foreign pulps have almost entirely supplanted the domestic product, insofar as regards current purchases by consumers, which is but a logical condition when one stops to consider the different level of prices ruling on domestic and foreign pulps.

Both the Swedes and the Germans are sending good-sized quantities of pulp to the United States. It is said authoritatively that this country represents about the only market European producers have for the present, there being practically no sale for pulp in England, Spain, Italy and other consuming countries on the other side on which the Scandinavians and Germans ordinarily depend to take a part of their output, and apparently with Swedish and German manufacturers in a financial position where they are obliged to liquidate pulp stocks, they are sending supplies into the American market at such prices as can be obtained from paper mills here. There have been charges that the Europeans are "dumping" pulp into the United States in violation of the anti-dumping clauses in the Emergency Tariff act, and this phase of the situation is now being investigated by Department of the Treasury officials.

Bleached sulphite of No. 1 quality has sold down to 3.75 cents per pound ex the dock at Atlantic ports, and additional supplies are reported on offer at the same price. Unbleached sulphite of No. 1 grade is selling at 2.50 cents a pound, while Scandinavian kraft has sold in sizeable tonnage down to 2 cents a pound, though a more representative quotation now is about 2.15 cents. Foreign ground wood is offered at $27 a ton ex the dock.

Demand has been of sufficient volume to almost clear spot stocks in this country, and most of the offerings now being made involve pulp for shipment from primary sources. A bright feature of the situation—from the domestic pulp manufacturer's viewpoint—is that most of the pulp being marketed at prevailing prices by Europeans constitutes surplus supplies, and it is understood that producers on the other side are shutting down their mills because of their inability to make pulp at a profit under present circumstances. This should mean that as soon as surplus holdings are absorbed the situation should take on an entirely different complexion.

Receipts at the port of New York in August, which show a large increase over the several preceding months, and approximate current market quotations follow:

Bleached sulphite	$ 3.75- 4.00
Unbleached sulphite, No. 1	2.50- 2.75
Easy bleaching	3.00- 3.25
Mitscherlich unbleached	3.25- 3.50
Kraft	2.10- 2.25
Ground wool, per ton	27.00-28.00

National Bank of Commerce, 800 bls. from Trondhjem and 670 bls. from Gothenburg; Castle, Gottheil & Overton, 3,247 bls. from Rotterdam; Nilsen, Rantoul & Co., 12 bls. from Gothenburg; Scandinavian-American Trading Co., 1,397 bls. from Gothenburg and 7,200 bls. from Helsingfors; A. J. Pagel & Co., 6,180 bls. from Gothenburg and 1,200 bls. from Skien; E. M. Sergeant & Co., 150 bls. from Gothenburg; Woodpulp Trading Co., 600 bls. from Gothenburg and 3,600 bls. from Helsingfors; M. Gottesman & Co., 200 bls. from Gothenburg and 200 bls. from Skien; American Woodpulp Corp., 125 bls. from Sundsvall and 4,767 bls. from Gothenburg; C. L. Robinson, 1,050 bls. from Sundsvall; H. Hollisen, 7,500 bls. from Konigsberg, 5,000 bls. from Bremen and 5,521 bls. from Rotterdam; Fred Enders & Co., 512 bls. from Hamburg; Lagerloef Trading Co., 9,070 bls. from Stockholm; Kelly & Co., 6,000 bls. from Skien; National City Bank, 1,800 bls. from Helsingfors; Order, 988 bls. from Gothenburg, 750 bls. from Sundsvall, 1,000 bls. from Christiania and 239 bls. from Rotterdam.

Paper Stock

Importations of paper stock into the United States show little or no increase over recent months. Arrivals at the port of New York during August were almost negligible in quantity aside from a few moderate-sized shipments of rags and old rope, and clearly reflect the limited demand for such goods at the present time. Importers assert that they are refusing to bring supplies into the country unless having obtained mill orders beforehand, it being their contention that the downtrend in values invariably necessitates that they shoulder a financial loss in disposing of imports to consumers otherwise.

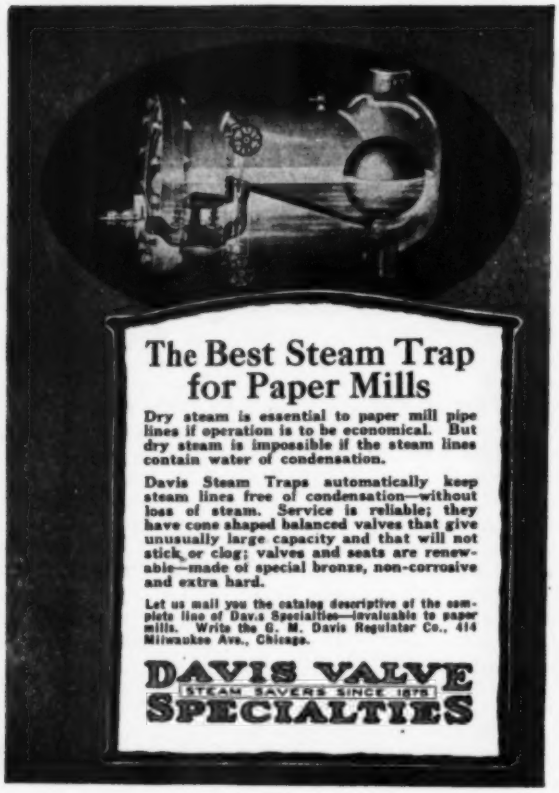
Arrivals at New York in August follow:

Old Rope

Brown Bros. & Co., 260 coils from Hull and 123 coils from Bristol; International Purchasing Co., 61 bls. from St. Nazaire and 46 bls. from Havre; J. Forsythe, 10 bls. from San Juan; First National Bank of Boston, 215 bls. from Antwerp; Maurice O'Meara Co., 110 coils from Antwerp; H. H. Cummings & Sons, 249 coils from Copenhagen; Order, 120 coils from Rotterdam.

Rags

Equitable Trust Co., 841 bls. from Brest; W. Schall & Co., 177 bls. from Marseilles; Goldman, Sachs & Co., 253 bls. from Antwerp, 267 bls. from Rotterdam and 381 bls. from Bremerhaven; Harriman National Bank, 177 bls. from Rotterdam; State Bank of New York, 41 bls. from Hamburg; Ladenburg, Thalman & Co., 10 bls. from Hamburg, 907 bls. from Rotterdam and 51 bls. from Bremerhaven; Irving National Bank, 114 bls. from Bordeaux and 53 bls. from Marseilles; Castle, Gottheil & Overton, 204 bls. from Antwerp and 377 bls. from Rotterdam; Chemical National Bank, 156 bls. from Rotterdam; E. J. Keller Co., 64 bls. from Bremerhaven, 105 bls. from Hamburg, 158 bls. from Bremen and 856 bls. from Rotterdam; American Woodpulp Corp., 664 bls. from Bremerhaven; R. F. Downing & Co., 38 bls. from Rotterdam; G. P. Lotterham, 32 bls. from Rotterdam; Mechanics & Metals National Bank, 400 bls. from Brest; Bernard, Judae & Co., 1,125 bls. from Brest; Shaap & Sons, 3,005 bls. from Brest; Order



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Dry steam is essential to paper mill pipe lines if operation is to be economical. But dry steam is impossible if the steam lines contain water of condensation.

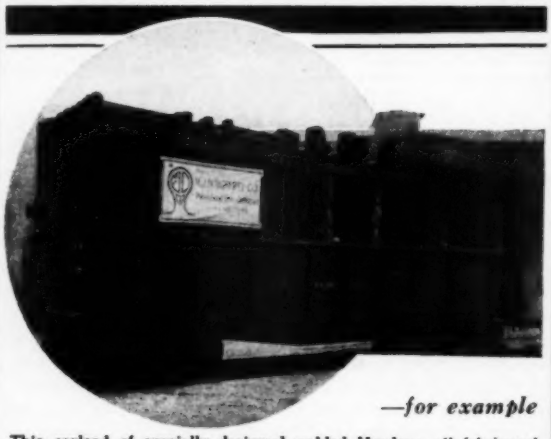
Davis Steam Traps automatically keep steam lines free of condensation—without loss of steam. Service is reliable; they have cone shaped balanced valves that give unusually large capacity and that will not stick or clog; valves and seats are renewable—made of special bronze, non-corrosive and extra hard.

Let us mail you the catalog descriptive of the complete line of Davis Specialties—invaluable to paper mills. Write the G. M. Davis Regulator Co., 414 Milwaukee Ave., Chicago.

DAVIS VALVE SPECIALTIES

STEAM SAVERS SINCE 1875

PIPING FABRICATED & ERECTED



—for example

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The Noria was used in a number of ancient countries — China, Palestine, Syria and Spain.

The Noria—a type of ancient waterwheel—dispensed with the usual oxen. It was driven by the running stream—acting on the floats or paddles. A "trip" emptied the contents of the buckets into an elevated tank, from which point it was carried by a trough to the ditches below.

You will find that modern American-Marsh Pumps dispense with every unnecessary part. There are no internal stuffing boxes, no tappets, and no slide valves.

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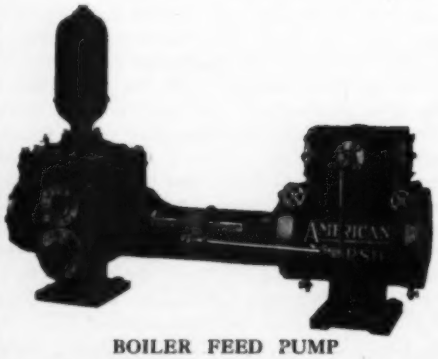

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The American-Marsh line also includes Centrifugal Pumps, Power Pumps, Air Compressors, Vacuum Pumps, Condensers, Deep Well Engines, Stock Pumps

588 bls. from Bremen, 77 bls. from Antwerp and 16 bls. from London.

Miscellaneous Paper Stock

Diamond Mills Paper Co., 18 bls. from Manchester; E. J. Keller Co., 18 bls. from Belfast; Irving National Bank, 27 bls. from Hamburg; Mechanics & Metals National Bank, 22 bls. from London; Order, 16 bls. from Glasgow.

Paper

Importations of print paper in August were fairly large in comparison with the several preceding months, a total of about 24,000 rolls of news print being received through the Port of New York last month, contrasted with 12,000 rolls in July and 9,000 rolls in June. It is estimated that imports of news print thus far this year have been at the rate of approximately 120,000 tons annually, which is equal to about one-tenth of the United States' 1920 production and about 6 per cent of present consumption. Imports of cigarette paper continue fairly large, and there were sizeable shipments of wrapping, hanging and filter papers and straw board. Arrivals through the port of New York in August, as shown on incoming vessels' manifests, follow:

Cigarette

Irving National Bank, 5 cs. from Trieste; Southern Pacific Co., 2 cs. from Havre; American Tobacco Co., 2,000 cs. from Bordeaux and 25 cs. from Havre; P. J. Schweitzer, 50 cs. from Marseilles; Surez & Crespo, 3 bls. from Barcelona; Surbrug Co., 16 cs. from Hamburg; R. J. Reynolds Tobacco Co., 1,130 cs. from Bordeaux; Camancho, Roldan & Van Sickel, 101 cs. from Havre; Order, 10 cs. from Marseilles.

Printing

H. Reeve Angell & Co., 3,969 rolls from Kotka, 1,527 rolls from Helsingfors; National Bank of Commerce, 552 rolls from Rotterdam and 915 rolls from Sundsvall; Chemical National Bank, 29 cs. from Rotterdam and 213 rolls from Hamburg; B. F. Drakenfeld & Co., 43 cs. from Liverpool; P. Puttmann, 20 cs. from Antwerp; Globe Shipping Co., 61 cs. from Rotterdam and 72 cs. from Hamburg; E. C. Melby, 621 rolls from Christiania; C. G. McAlpine, 152 rolls from Gothenburg; Oxford University Press, 7 cs. from Liverpool; American Express Co., 466 rolls from Sundsvall; N. A. L. Agency, Inc., 1,052 rolls from Christiania; Equitable Trust Co., 1,489 rolls from Hamburg; H. Lips, 225 cs. from Antwerp; C. L. Robinson, 349 rolls from Gothenburg and 133 rolls from Skien; National Park Bank, 1,277 rolls from Gothenburg and 1,266 rolls from Helsingfors; Tamm & Co., 11 cs. from Rotterdam; New York American, 3,471 rolls from Stockholm; New York Globe, 49 rolls from Stockholm; J. J. Nolan, 96 rolls from Skien; Mail Export Co., 275 rolls from Christiania; Poland Paper Co., 667 rolls from Gothenburg; Sun-Herald Corp., 1,033 rolls from Gothenburg; Maurice O'Meara Co., 97 rolls from Helsingfors; Order, 1,322 rolls from Kotka, 741 rolls from Sundsvall, 644 rolls from Hamburg, 1,526 rolls from Stockholm, 180 cs. from Antwerp and 867 rolls from Rotterdam.

Wrapping

American Mills Co., 24 bls. from Rio de Janiero; Irving National Bank, 458 rolls from Sundsvall; Birn & Wachenheim, 57 bls. from Rotterdam; National City Bank, 1,431 bls. from Christiania; Maurice O'Meara Co., 420 bls. from Helsingfors; Ladenburg, Thalman & Co., 230 rolls from Hamburg; First National Bank, 29 cs. from Hamburg; Republic Bag & Paper Co., 655 rolls from Hamburg.

Hanging

R. F. Downing & Co., 16 cs. from Yokohama; W. H. S. Lloyd & Co., 7 bls. from London; E. J. Emmerich & Co., 3 cs. from Hamburg and 3 cs. from Antwerp, A. C. Dodman, Jr., & Co., 41 bls. from Liverpool; A. Murphy & Co., 25 cs. from Liverpool and 4 cs. from Havre; Prager Co., 1,837 bls. from Antwerp; State Forwarding & Shipping Co., 4 bls. from

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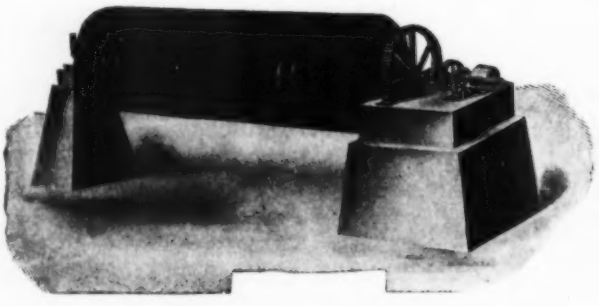

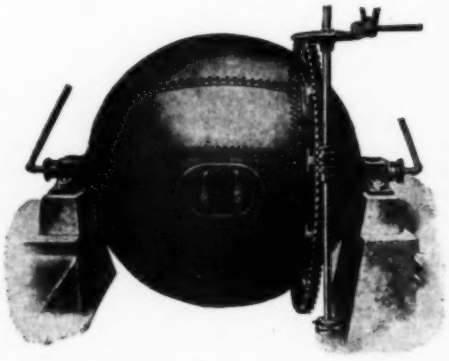

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